The Business of Branded Beef

Examining the intersection of value chain collaboration, provenance, and distributed ledger technology for the Australian beef industry

A report for

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Executive Summary

Successful brand owners around the world were interviewed during this project to examine the factors which affect aspects of the agri-food value chain relatable to branded beef production in Australia. This research identified opportunities for individual business, as well as across industries.

The key findings observed for collaborative value chains focused on the importance of interpersonal collaboration to counter a generally low level of contractual rigor in the value chain. Value chains are significantly limited by the restriction placed on the availability of service processing capacity by the market power of conglomerates, often multi-national processors. Other interviews indicated that defining 'what is value' is critical and needs to be adequately resourced as part of the business. The need to integrate customer-led design as a method of creating unique experiences for customers were also significant observations.

Globally there was little in-depth understanding, and adoption of, distributed ledger technology. However, there is a recognised need to invest in exploring which applications, built on a distributed ledger technology platforms, will add value to the branded beef business by reducing risk and increasing collaboration and trust to capture premiums across the product range.

This report is targeted at beef producers, branded beef owners, industry and government. The report did not consider non-food products such as hides and other by-products, however, these findings can mostly be applied to other proteins and commodities where the potential to brand a product is a possibility.

The major conclusions are that:

1. Reliable access to service processing needs to be established in strategic locations as this is the single greatest barrier to entry and blockage for the development of producer-led beef brands in Australia, particularly Queensland.
2. Producers should assess business risk in terms of how much they are leveraged into single or limited markets, and immediately examine the potential for branded beef program development. There is a need to invest in the cultivation of mutually beneficial relationships to identify and establish opportunities for collaboration across the value chain.
3. Experiences should be incorporated to create an emotional connection with branded beef programs: explore the adoption of immersive technology and to develop physical visitor infrastructure.
4. Distributed Ledger Technology should be trialled for adoption to credential beef brand provenance value through a system of trust. By utilising technology such as Blockchain, producers and suppliers could investigate how to prove to consumers that there is a verified value chain, from quality to country of origin, that facilitates trust and provides a foundation for a new premium product.

5. Value should be placed on a ‘small giant’ philosophy: it is not necessary to ‘go big to be great’. Producers can be small and top shelf, running profitable and personally satisfying branded beef businesses. Scale does not inevitably equal success.

The results of this study demonstrate it is possible to have a successful, profitable and sustainable producer-led branded beef business that delivers personal satisfaction through brand value, customer and value chain engagement and returns a premium for the perceived value to the market.

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Foreword

Figure 1: Sonya Comiskey, 2018 Scholar, Southern Cross Beef

I have been involved in the beef industry for more than a decade, starting out as co-founder of a French heritage Bazadais beef stud and commercial cross breeding operation based at 'Old Mount Stuart', a 24,500-acre station in the Capella district, Queensland.

At the time I commenced my Nuffield journey, I was married to a fifth-generation cattleman, and we were trying to carve out our own branded beef partnership within a multi-generational commodity-focused operation across four families. Our business was recognised as a leader in the production of high-quality beef, having year-on-year, received awards in some of the largest carcase competitions in Australia.

As I publish this report, I am now sole founder of a new independent branded beef program. Building off what I have learned during my scholarship, I collaborate with other regional beef producers, feedlots, processors and technology platform owners to supply authentic French heritage beef and regionally produced beef 'from the heart of Queensland'. Together we are trialling the adoption of new technologies to support the marketing of the *Southern Cross Beef* and *Epicurean Beef* (under development) brands across domestic markets with a view to expanding into export markets, predominantly in the Asia-Pacific.

The idea of moving away from traditional commodity beef production blossomed during a period of adversity that created a 'perfect storm' of challenging conditions. At the time, we were running a breeding and fattening operation producing award-winning cross-bred beef as well as stud French Bazadais cattle. We were without any formal certification scheme accreditations, such as EU, PCAS or Organic from which to garner a premium. Operating within a broader family business, who had little appetite for change to the status quo, constrained our ability to seek standalone accreditations with commingled operations. At the time, the best we could hope for in terms of seeking additional margin return for our product was to sell MSA-grading grass fed cattle over the hook (OTH) into the Japanese Ox market.

In this commodity beef production model, we essentially only had two customers – multinational processing giants JBS and Teys, who are our nearest processors. The 'perfect storm' was created when, after a period of extended drought, we needed to de-stock significantly as we had little grass available for our fat cattle, having held out for rain for an extended period. When seeking to schedule processing of these cattle, I was shocked to discover that we had to wait some 12 weeks before they were able to be processed by either of our Central Queensland based processors. Furthermore, given the high numbers of other producers also de-stocking in the region, oversupply into the market significantly depressed prices. We did not have any other customers or markets to sell to. We were fully leveraged into that market with an extremely limited number of options.

To make matters worse, the Live Export ban in 2011/12 saw a flood of cattle into our local region's feedlots and processing marketplace, further compounding pressure on prices and schedules. Given that I come from a non-agricultural background, I looked around at the situation we were in and thought, '*This is not a good way to do business. We have too few customers, we are fully risk exposed and we are operating as price (and schedule) takers. How can we possibly effectively manage a business where we have so little control or even influence, over these elements? It doesn't make sense to me'.*

In parallel, we were enjoying considerable success with our beef in carcase competitions, such as the renowned 'Paddock to Palate' at the Royal Queensland show ('The Ekka'). From our first entry in 2015 to the date of this report being published, our beef has won prizes for our carcase quality and/or overall performance. The Ekka is one of the biggest carcase competitions in Australia and we have been benchmarked against some of the most successful producers and seed stockers in the industry. Yet, we were not garnering any significant premium outside of MSA grading, in the commodity beef market.

We started working with a renowned French restaurant in Brisbane to host events to promote our genetics and the Bazadais breed, using our own beef from the competitions in a limited personal buy back arrangement.

Reading superior results in carcase grading data is nice, but having a talented chef shove a portion of beef in your face and expound on product quality and how that connects them with their passion for cooking was a more emotionally satisfying experience for me. Sharing in the way that people treasure the experience of a truly artisanal and memorable dining event through the magic of 'great chef meets great produce' where they appreciate and value the story of the product and its production was truly rewarding. I love sharing the cultural heritage value of this breed (formally recognised in France) which has been annually celebrated in France for more than 730 years. I was shocked to learn how it was also almost lost to the world as recently as not much more than a generation ago. In their 2019 report "The State of the World's Biodiversity for Food and Agriculture" the UN's FAO informs us that "*…more than 150 livestock breeds have become extinct in the world between 2000 and 2018 alone. As of March 2018, 7,745 breeds out of the 8,803 breeds recorded by FAO were classed as local breeds (i.e. reported present in only*

one country). A total of 594 local breeds were extinct. Among extant local breeds, 26 percent were classified as being at risk of extinction, 7 percent as not at risk and 67 percent as being of unknown risk status". Maintaining and sustaining biodiversity contributes to the UN's SDG 15 "Life on Land". I am passionate about heritage breed values and the traits they bring to the consumer and their preservation.

When we sold cattle to JBS or Teys, I only knew what country our beef was likely to be destined for and not much more. Was it good? Did people enjoy it? If only they had an appreciation for the heritage of the genetics that went into growing it. The idea for taking more control and marketing our product, as well as accessing greater personal satisfaction from following the product all the way through the value chain, became clear. Yet learning how to do this and making considerable change to an old-fashioned commodity beef business was another thing!

Currently, there is little support or information in the beef industry for the development and implementation of producer-led beef brands. There is a lack of information about collaboration models for beef supply to brand owners. The Queensland Government recently published a number of reports by Ernst & Young evaluating the future for Queensland beef where they identified a significant opportunity for leveraging provenance and niche, premium brands, however, not once was service processing mentioned in their supply chain analysis (Ernst & Young, 2018). It seems that there is an underlying assumption that brands may only be the business of multi-national processors and no other business model opportunities exist to grow the sector. Aside from these recent documents, there is little written about the value of beef provenance, approaches to building branded beef programs to leverage provenance value for premium returns, and distributed ledger technology implementation to underpin collaboration and provenance through connecting the value chain from conception to consumption. It is in its absolute infancy. To date I am aware of a limited number of beef brands using Blockchain technology in domestic and/or export markets.

Acknowledgments

Figure 2: Victor Comiskey and Roman Comiskey

My Nuffield journey has been epic, to say the least. My report is dedicated to my two much loved children, Victor and Roman.

You may well be surprised to know that for many people, upon hearing of my Nuffield scholarship, the first words out of their mouths, was to express their concern about travelling away from my children for extended periods of time during my studies, rather than offer congratulations. Sadly, this has been reported as a common experience amongst us scholars who also happen to be mothers. I truly believe that despite those long absences, my Nuffield journey has shown my children that the success of female founders comes from "going the extra mile" and that for them, they too need to do the extra work which success and personal development requires. I trust that my example will mean that, in their generation, they model a different type of behaviour in relation to the perception of women in agriculture, particularly the mothers, who are operating in business leadership roles.

Special thanks to my parents Mike and Nola and my sister, Ludie for their ongoing support and assistance, as well as Kerri and Wayne Deakin, Karissa Deakin, Mary Ryan and Cameron Black for looking after the boys in my long absences – none of this amazing experience would have been possible without your plentiful help and care.

Of course, the generous and ongoing, patient support of my investor, Rabobank, ably represented by Nerida Sweetapple and Will Banks has been essential to the delivery of this work. I thank you immensely. Rabobank's global network, passion for agriculture and amazing people are extraordinary and I feel lucky to have had them as my investor. Thanks to all the staff at Nuffield Australia, Nuffield International and organisers of the 2018 Contemporary Scholars Conference, Nuffield Netherlands. Gratitude to the best Global Focus Program team ever – a truly memorable experience with Japan GFP 2018. I value your friendships, feedback and good humour more than you probably realise.

Specifically, I would also like to thank those organisations and businesses who gave up their time for me to come and poke around under the hood and ask lots, and lots, of questions, including:

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- Nortonbrook Farm, England: Charlie Langford
- Chase Distillery, England
- St James Cheese, England: Martin Gott & Nicola Robinson
- Quality Meat Scotland, Scotland: Stuart Ashworth, Doug Bell & Maggie Bennett
- The Balvenie Distillery, Scotland: David Mair
- Loch Fyne Oyster Farm, Scotland: Daniel Johnstone
- McKees Country Store, Northern Ireland: Colin McKee
- Glenarm Shorthorn Beef, Northern Ireland: Adrian Morrow
- Karol & Caroline Kissane: Co. Kerry, Ireland
- Avara Foods, Wales: Emma O'Flaherty & Christi Nicolae
- Bovina Feeders, USA: Cee Arnett
- Heartbrand Akaushi Beef, USA: Jo Jo Carrales & Jordan Beeman
- American Akaushi Association, USA: Kaci Carrales
- Heritage Foods, USA: Patrick Martins & Emily Pearson
- Cecconi's Dumbo Restaurant, USA: Jeremy Price
- Tim Hutchings: Nuffield Australia

Abbreviations

ABS: Australian Bureau of Statistics

ASX: Australian Stock Exchange

AUD: Australian Dollars

B to B to C: Business to Business to Consumer

CEO: Chief Executive Officer

DEXA: Dual Energy X-ray Absorptiometry technology

DLT: Distributed Ledger Technology

EU: European Union

FAO: Food and Agriculture Organisation of the UN

GPS: Global Positioning System

HGP: Hormonal Growth Promotant

IMF: Intra Muscular Fat

IP: Intellectual Property

MSA: Meat Standards Australia

MLA: Meat & Livestock Australia

NCMC: Northern Cattle Meat Cooperative

NLIS: National Livestock Identification Scheme

NSW: New South Wales

OTH: Over the hooks

PCAS: Pasturefed Cattle Assurance Scheme

PGI: Protected Geographical Indication (EU)

PwC: Price Waterhouse Coopers

ROI: Return on Investment

SDG: Sustainable Development Goals (UN)

UK: United Kingdom

UN: United Nations

USA: United States of America

Objectives

The objectives of this study were to address key challenges in bringing a branded beef program to market. In addition, there is the potential to utilise a value-chain model based on shared values, true collaboration and the adoption of enabling technologies as an alternative to simple 'meat trading arrangements' – characterised by the swinging price fluctuations of the beef commodity supply chain meaning producers remain 'price takers' rather than 'price makers'.

Factors affecting the following aspects of the agri-food value chain were identified, along with opportunities for application across the industry:

- Collaborative value chains to achieve commercial scale for premium beef brands into niche segments in the domestic and export markets.
- Branding and marketing of premium niche beef brands, particularly telling the story of heritage provenance value connecting consumers to producers.
- Application of distributed ledger technologies for credentialing beef brands and possibly unlocking opportunities to adopt new ways of doing business.

Chapter 1: Introduction

1.1 Australian beef industry overview

Beef cattle production is a well-established and major industry in Australia with beef cattle produced in all states and territories under both grass-fed and grain-fed (also referred to as feedlot or lot-fed) systems. The Australian national beef cattle herd totals approximately 26 million head (ABS, 2017) and accounts for 55% of all agricultural farms in Australia. The value of Australian cattle and calf production is valued at AU$12.7 billion (ABS, 2017).

Australia is the world's seventh largest beef producer and ranks third largest in the world, behind Brazil and India respectively, in terms of beef exports. Approximately 70% of all the beef produced in Australia is exported.

Ernst & Young state that 98% of Australian beef farms are family owned. In Queensland, cattle production is the state's largest agricultural industry and plays an important role in the Queensland economy with that state home to almost half the national herd (and volume of beef produced) and a third of the nation's processors (Ernst & Young, 2018). *Queensland is the only state with a 'proportion of volume produced' higher than its 'proportion of total processors'. This illustrates that Queensland's processors are each producing, on average, more beef than the processors in the other states (Ernst & Young, 2018).*

1.1.1 Processing

Travelling in the United Kingdom (UK), Ireland and the United States of America (USA) it was repeatedly observed that constraints to availability of service processing capacity placed on producers by processors was one of the major barriers to entry to market and to scaling up branded beef programs. Australian producers are faced with similar challenges; at the time of writing this report, the author was unable to access service processing for cattle at any export accredited processor within 14-hours by road radius, including Northern Cattle Meat Company (NCMC) in Casino, New South Wales (NSW), a specialist service processing cooperative. The spike in processing volumes, particularly for female cattle, due to drought in numerous areas of NSW and Queensland, has caused a bottleneck for processors with no capacity left for smaller branded beef programs. This is not the first time this has happened, and the situation is catastrophic for niche branded beef programs.

Not only does the seasonal and market-driven peak in processing demand create issues but there are few processors in the market who offer processing as a service when compared with the number of processors who pack for their own brands or large agrifood corporations. This was the case in other countries as well. Three producer-led brands (who asked not to be identified) agreed that the domination by a small number of processors for the majority of the market, meant that access remained difficult, with few options. In August 2019, Food Manufacture magazine reported that of the 249 abattoirs in the UK, only 56 are small red meat operations. There has been a 99% decline in the number of abattoirs in the UK between 1930 and 2017. The

UK's Sustainable Food Trust's report in 2019 concluded that the growth in the closure of smaller abattoirs over the past four decades coincided with the rise of multiple retailers in the UK and the construction of newer and larger abattoirs to supply them directly. Service processing the needs of smaller brands and smaller distribution pools appeared to be a business model under threat in the UK. One UK producer-led brand interviewee said that they had approached numerous processor distributors to partner with and they were refused collaboration with all but one. That product has gone on to win global awards for eating quality, yet they remain heavily risk exposed with only one processing partner available in their market.

The Queensland Beef Supply Chain document characterised the situation in Queensland without referral to service processing, producer-led brands or even premium, niche market exploitation, as an either a current practice or future opportunity (Ernst & Young, 2018). Ernst & Young also described Australia's current standards on biosecurity, animal welfare and product integrity position it favourably to target premium markets through niche products and brand development, in a market of growing ethically and environmentally conscious consumers with an emphasis on provenance. Examples of brands the document references are primarily drawn from multi-national processing companies (Ernst & Young, 2018).

1.1.2 Markets

Agrifutures Australia describes the main selling systems in Australia as:

- **Saleyard auction** – livestock are transported to central saleyards and sold to the highest bidder. Prices reflect supply and demand in the market on the day.
- **MSA eligible sales** – cattle can only be sold through MSA licensed saleyards or livestock exchanges. Producers and agents must be registered.
- **Paddock sales** – livestock are inspected on the vendor's property by a buyer or agent and sold from the paddock.
- **Stockyard sales** – livestock are weighed, graded and priced for sale.
- **Over the hooks** – livestock sold OTH are delivered directly to the abattoir with change of ownership taking place at the abattoir scales. Terms of sale vary between abattoirs. Livestock must be accurately assessed for sale to avoid price penalties.
- **AuctionsPlus** – an electronic online auction for the sale of livestock by description. Combines the best features of the saleyard system and allows direct consignment to the abattoir or buyer.
- **Forward contracts** – a contractual agreement between a seller (e.g. producer) and buyer (e.g. processor) to supply a given product at a future point in time for a given price. In some cases, the price is fixed thereby reducing the producer's exposure to a fall in market price.
- **Producer alliances** – a group of producers working together to service marketplace requirements.
- **Value-based marketing** – based on the principle of being paid for the inherent value (quality and quantity) of the product to the buyer and the end user, such as systems that

provide clear feedback from the consumer to the producer and has a pricing system supporting these signals. To the author's knowledge this system is currently only being considered by Teys as a mechanism for the development of an alternative price-grid methodology for OTH sales utilising DEXA-measured red meat yield measurement, rather than a novel or new selling system. (Agrifutures Australia, 2017)

"Producers may use one or more of these selling options based on a range of personal and business considerations including tradition, financial position, urgency to sell and appetite for risk." (Agrifutures Australia, 2017)

There are a limited number of fundamental selling methods for livestock production in Australia, mainly based on the type of cattle people are raising e.g. young stock for finishing elsewhere, vealer market, breed and finish, finishing only and feed lotting. For producers finishing cattle, the number of vendors to market to are generally limited.

In this context, it is important for producers to take off their 'agricultural hat' and simply think of themselves as a generic business and look from a perspective of risk. Have producers spread their risk across more than one customer, more than one market, or for some producers, more than one product?

A strong mindset exists in the industry that broadacre production is the only commercially viable primary production model and 'the more acres the better'. However, significant financial returns were observed being produced by farmers in Europe from relatively small primary production operations with highly diversified revenue streams and direct marketing to butcher, foodservice and consumer trade.

1.1.3 Live export and risk mitigation

An example which is particularly relevant for this discussion is the reliance on Live Export markets for Northern Australian beef producers. An Australian Senate inquiry into the 2011 live cattle ban by the former Labour government, revealed details of the snap decision's brutal and immediate impact on not just cattle producers but other supply chain participants and their families (Bettles, 2018). Do we know what changes producers, reliant on the Live Export trade, have made to their business to mitigate the risk of this catastrophic impact on their operations for the future?

When questioned on the future of the live export market and the risk to Northern Australian producer businesses, 2018 Nuffield Scholar Alison Larard said:

"Most Northern producers supply live-export to some degree. They are completely reliant on it as a means of keeping the processors honest from a pricing perspective. It's also an easy option in terms of meeting the specifications to supply. If we lose the live trade, many Northern producers will be caught. They can't easily finish cattle for the domestic or heavy trade. They'll be back running marginal operations being treated as the cheap 'calf factory' for southern feeder markets" (pers. comm. A. Larard 2019).

The author is currently collaborating to deliver a pilot project with a North Queensland producer supplying crossbred Bazadais cattle to her branded beef program. These steers and heifers are bred and weaned with seasonally dependent backgrounding prior to being grain finished and processed in south-east Queensland and northern NSW. This collaboration has enabled this producer to redirect a component of his traditional live export production to an alternative market at a premium price, thereby reducing reliance on live export as a primary market option and offsetting some risk exposure.

The cattle produced are of a high standard, using good genetic inputs coupled with best practice production. However, lack of access to service processing facilities mean cattle are transported vast distances to be fed in southern Queensland. This aims to minimise the distance between finishing and processing in either south-east Qld or northern NSW for animal welfare and eating quality outcomes.

Collaboration with other producers or branded beef program value chains represents an opportunity not commonly explored in Northern Australia, particularly, Queensland's northern beef regions. Greater participation in supply chain can earn a significant premium above commodity prices in return for the increased risk shared between collaborators.

The means by which an inventory of cattle can be accessed is a critical element for producer-led brands. From site visits and interviews, the research examined the value chain with supply considered through three concepts:

1. Supply by individual only.
2. Supply by individual and from others.
3. Supply from others only.

Chapter 2: Collaborative Value Chains

2.1 Supply chain versus value chain

In examining the supply of cattle, as well as other types of inventories for branded agrifood programs in Europe and the USA, it was apparent that successful businesses tended to work in the space of value chains, rather than supply chains. In contrast, commodity beef production in the Australian beef industry was observed to function primarily in a traditional supply chain.

2.1.1 What is a value chain?

The value chain concept was developed and popularized in 1985 by Michael Porter, in his publication "Competitive Advantage." Porter defined value as the amount buyers are willing to pay for what a firm provides, and he conceived the value chain as the combination of nine generic value-added activities operating within a firm – activities that work together to provide value to customers. Figure 3 (Weiner, 2014) illustrates that the value chain and the supply chain are so closely related that essentially the same process flow is considered from two different perspectives. This is a critical component in how these structures differ and one where the approach to collaboration, business structures and customer engagement are markedly different from traditional commodity production models.

Supply chains describe the flow of resources, in this setting cattle and later beef, from the supplier to the customer. The value chain is the flow of value (as perceived by the customer) from the customer to the buyer. This may mean that processes or functions carried out by each "block in the chain" can be assigned some value that correlates with a pricing premium at the customer-product exchange point.

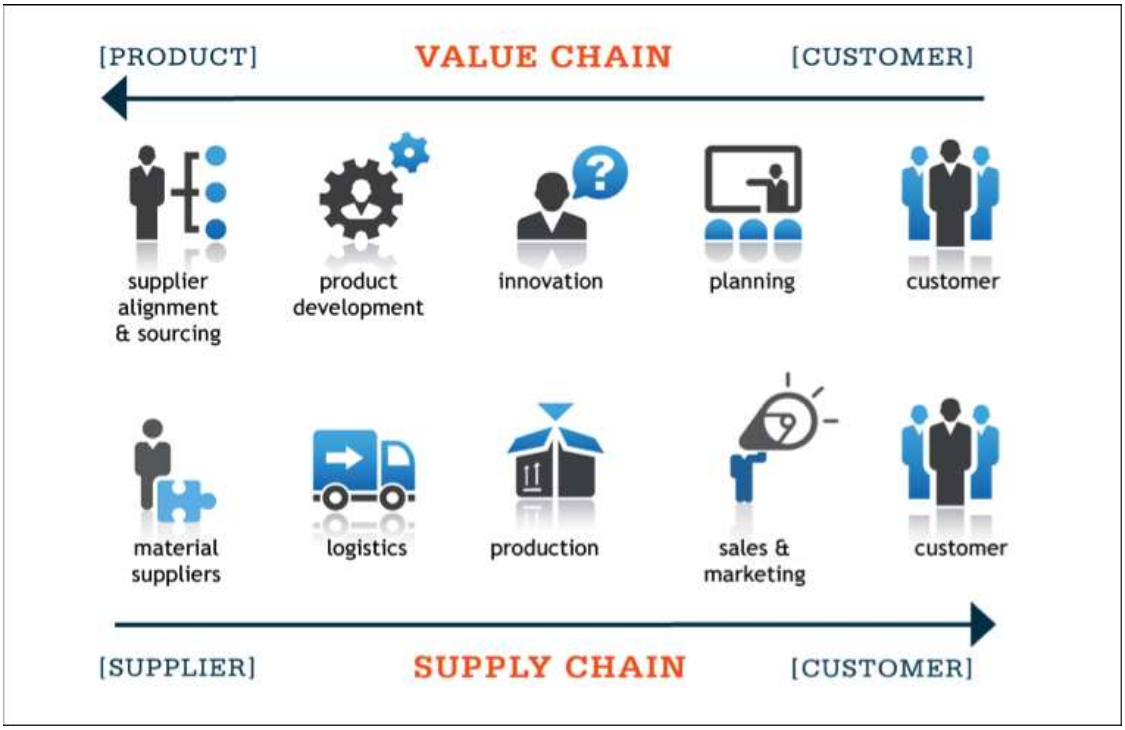

Figure 3: Supply Chain vs. Value Chain (Weiner, 2014)

"It is now widely agreed that a well-functioning value chain is critical to the business competitiveness and long running success" (pers comm. Professor Wendy Umberger, Executive Director, Centre for Global Food and Resources, University of Adelaide, 2018).

The value chain for a branded beef program could well be considered as taking a "retrospective view from consumption to conception".

Collaborative models, where each participant has a stake in the others' success, are inherently value chains; value is added in each block of the chain which increases the perceived value of the product at its moment of transactional exchange, namely consumption.

By looking back from the point of consumption, and establishing what value we can create for customers, we can then understand and quantify the price consumers are willing to pay for it.

2.1.2 Distributed value chain

The linear models were not observed to be sufficiently connected to support collaboration in the value chain, and that an improved model would support better outcomes (Figure 4).

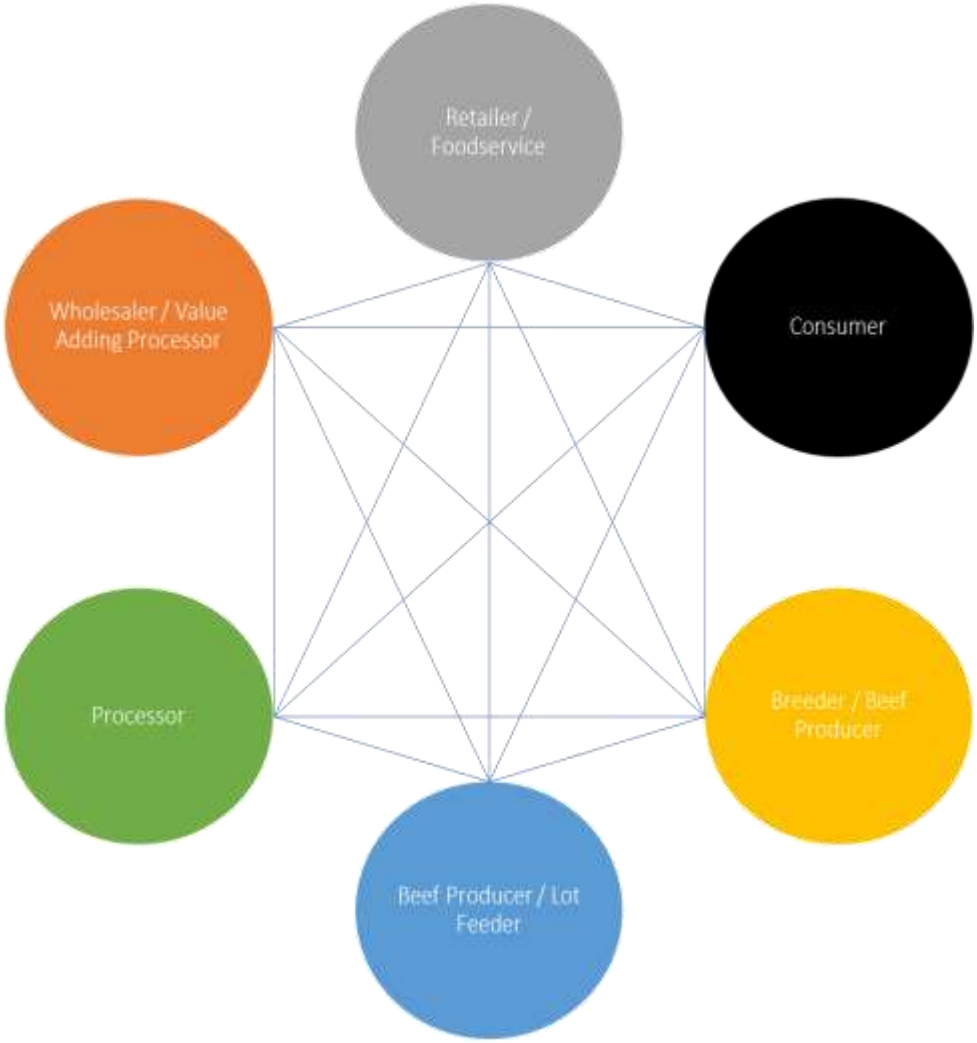

Figure 4: Distributed Value Chain Model (Comiskey, 2019)

This model is very similar to a distributed network model (Figure 11) explored in this report. The value chain components in this model are provided as an example. There are numerous versions of these components, depending on how the business is structured. In this model the identification of opportunities to create value in the product lifecycle are not confined to interaction with the 'next block in the chain'; they can extend across multiple pathways in multiple directions and benefit can be derived from this non-linear interaction.

The author observed producers around the world working with collaborative value chains. Key examples of these practices included:

Dingley Dell Pork – England, UK

Foodservice, retail and wholesale staff visits to the farm for engagement (including physical interaction) with pigs, hands on observation and experience in their animal welfare management system. They have partnered with their wholesaler, Direct Meats, to conceive and deliver a project called *'One Million Bees'*, through which they have planted over 33 hectares of wildflowers to increase the population of pollinators in their farming operations. When farm visits are timed to coincide with flowering seasons, this creates a visceral connection with people in the value chain – much more than just telling people you are "doing things for the environment" (pers comm. Hayward, M., 2018).

Heartbrand Beef – Texas, USA

Producers and foodservice clients are hosted to visit the Heartbrand Akaushi Beef's flagship lot feeding partner, Bovina Feeders, located in the Texas Pan Handle, as well as their main custom processing plant, Caviness Packers, a modern operation that caters for external visits located nearby. This experience is further supported by visits to their home farm near Flatonia in Southern Texas, with farm tours and the Akaushi beef eating experience (pers comm. Carrales 2019). Connections between the various participants in 'blocks' of the value chain develops rapport across production boundaries and enables understanding of the processes and values each player enacts. Importantly, it establishes an emotional connection with the brand collaboration through an immersive, relational experience put together by the brand owner.

Chase Distillery – England, UK

This 'single estate' vodka and gin distillery provides the opportunity to utilise their beautifully appointed distillery venue and farming operations to their clients to host their own business events. This aids in bridging the 'Business to Business to Consumer' (B to B to C) gap and provides additional non-monetary value to their customers and supports the 're-telling' of their brand story to consumers by consumers.

La Granda – Genola, Italy

This provenance-oriented beef brand hosts Master Classes in collaboration with distributor, Eataly, in their flagship foodservice venue in Genola, Italy. Piedmontese beef is characterised as a lean "continental" carcase, which generally exhibit very low intramuscular fat when compared against the average Australian branded beef carcase. Consequently, it can be easily overcooked, resulting in a dry, chewy beef that detracts from the eating experience (pers comm., Trigale

2019). To offset this risk, and add value for customers, La Granda have engaged Michelin-starred chefs to deliver classes for their clients to educate them in the proper (and traditional) preparation and presentation of this heritage beef breed. As a result, the ability of the business to engage with their clients on the provenance of the product is improved, as well as managing the risk of poor product preparation. It also develops a rapport with people on an interpersonal level through experiential learning. Furthermore, La Granda incorporates an organisation that is a collective of fee-paying producer members who host monthly gatherings in the pursuit of knowledge exchange and continuous improvement. It was understood from listening to the collective's conversations that this included the processing element as well as input on sales and marketing components from the organisation's elected chair (pers. comm. Trigale, S, 2019).

Figure 5: Flagship La Granda food service outlet, Genola, Italy (Source: Author)

2.1.3 Collaboration

The motivation for participation in branded beef programs is more than purely financial in nature, although maximising returns remains important. Developing a strategic long-term value proposition requires investment in both technology and human capability. It requires technology to underpin the collaboration, and relies very heavily on highly-functional human relationships; working with the right people, the right business model and in the right conditions.

2.3 Value chain collaboration

There were several different value chain models observed in Europe and the USA, in terms of the supply of the primary production inventory:

1. Supply by individual only
2. Supply by individual and from others
3. Supply from others only

These models had a range of risk and opportunities.

2.3.1 Supply by individual only

Where a brand owner supplies all the inventory from their own herd or stock with no supply from any other parties.

RISKS	OPPORTUNITIES
• Supply constrained to maximum production output of one producer • Expansion at considerable capital costs e.g. acquisition of additional production area • Assumption of all the production risks, this may particularly apply to seasonal, geographic and biosecurity risks • Considerable operational management constraints	• Ability to highly influence quality and production system management • Ability to implement change with one single entity to deal with and influence • High degree of influence over data collection and analysis
EXAMPLES OF ORGANISATIONS USING THIS APPROACH	
• Chase Distillery, UK • Dingley Dell Pork, UK	

Table 1: Supply by individual only, risks and opportunities

2.3.2 Supply by individual and others

Where a brand owner supplies some production inventory from their own herd or stock and sources the balance from one or more other producers.

RISKS	OPPORTUNITIES
• Reduced influence over influence quality and production system management • Dilution of ability to implement change with more than one entity to collaborate with and influence • Less influence over data collection and analysis	• Supply less constrained with the ability to scale up or down with other parties • Considerably reduce risk in commitment to capital costs e.g. acquisition of additional production area, in order to scale up or down • Some sharing of production risks, this may particularly apply to seasonal, geographic and biosecurity risks • Spreading of operational management impost across more than one entity and

RISKS	OPPORTUNITIES
	potential to gain through access to collaborative IP • Link to non-price drivers of satisfaction in business, collaborators may feel like they are 'not just selling beef' but 'part of something bigger' associated with brand values. • Potential for adoption of a 'Circular Model' for seed stockers to influence genetic selections for branded beef program through so-called buy-back arrangements to supply branded beef programs such as Heartbrand Akaushi

EXAMPLES OF ORGANISATIONS USING THIS APPROACH:

- Heartbrand Akaushi Beef, USA
- Loch Fine Oysters, UK
- Glenarm Shorthorn Beef, UK

Interestingly Dingley Dell Pork reported having tried this model and subsequently returning to *a sole-supplier model,* following challenges in maintaining the superior quality standards their brand is known for (pers. comm. Hayward, M. 2018). One incentive used by Glenarm Shorthorn Beef for participation in their producer supply scheme is a guaranteed payment of 10% extra on the grid-based top-grade price, regardless of how the actual carcase grades. Their product demand currently outstrips supply (Pers comm, Morrow, A. 2019).

Table 2: Supply by individual and others, risks and opportunities

Figure 6: The Author with Adrian Morrow, Glenarm Shorthorn Beef Group Manager Northern Ireland (Image Credit: Jacqui Bateman Photography)

2.3.3 Supply only by others

Where the brand owner does not maintain their own herd or stocks from which to supply their program, inventory is sourced from other producers. In the extreme, this model is seen in the chicken and pork meat production models (particularly in the USA), where the farming production element of the value chain (from conception to consumption) is delivered 'as a service' by producers who essentially only own or control the land, buildings/equipment and labour element.

RISKS	OPPORTUNITIES
• Relatively low influence over quality and production system management, without considerable market power • Poor ability to implement change in another organisation without considerable market power • Low level of influence over data collection and analysis	• Supply less constrained with the ability to scale up or down with other parties' • Considerably reduce risk in commitment to capital costs e.g. acquisition of additional production area, in order to scale up or down • Much of the production risk is pushed off to the producer supplier, particularly apply to seasonal, geographic and biosecurity risks • Spreading of operational management impost across more than one entity and

RISKS	OPPORTUNITIES
	potential to gain through access to collaborative IP • Link to non-price drivers of satisfaction in business, collaborators may feel like they are 'not just selling beef' but 'part of something bigger' associated with brand values. • Potential for adoption of a 'Circular Model' for seed stockers to influence genetic selections for branded beef program through so called buy-back arrangements to supply branded beef programs
EXAMPLES OF ORGANISATIONS USING THIS APPROACH:	
• La Granda Piedmontese Beef, Italy	

Table 3: Supply only by others, risks and opportunities

Figure 7: La Granda dry-aged Piedemontese Beef, Italy (Source: Author)

2.4 Key messages: opportunities and challenges

2.4.1 Opportunity: people are everything

Key conclusions about the collaborative value chain component were that human relationships are critical and in fact the quality and effectiveness of human relationships could, at times, subvert the use of formal commercial contracts. This was quite surprising to the author. One UK brand (with a multi-million-pound turnover) had no formal contract with their processor-distributor and confidently said that the quality of their relationship was that rock solid that there was no need for one. There were few alternative processors or wholesale distributors available to them, so this step is taken at considerable risk, however the assertion was made with unwavering confidence. Similarly, a USA based brand (also with a multi-million-dollar turnover) indicated that they relied more heavily on relationships than contracts in their supply and distribution arrangements. In what the author observes as a highly litigious society, this state of commercial arrangements was surprising but was best summed up by both organisations agreeing that "people do business with people".

2.4.2 Opportunity: a fundamental shift in mindset required

It was also clear that successful businesses had experienced a fundamental mind shift in the way they think. They had lifted themselves out of 'operational thinking' into 'strategic thinking' roles. Rather than tacking on more elements to their roles as producers and thinking they could do it all, they made considered decisions around outsourcing and letting go of more operational duties that did not add value in their roles, embracing the classic 'working on your business, not in it' cliché.

Their roles have become that of ensuring all the moving components of the business are working together effectively as a function of the value chain – always with the end consumer in mind, closing the gap between consumer perceptions, packaging, logistics and processing, carcase data, production management systems all the way back to initial genetic selections.

This quote here from the Mark Heyward and Paul Heyward of Dingley Dell Pork, UK demonstrates this change in mindset:

> *Several years ago, we realised that we were not pork producers; we were food producers and we needed to understand what it was that constituted taste and flavour, and what we needed to do to enhance this. By working with one of the UK's top meat scientists, Caroline Kealey, we examined every part of our production from farm to plate. (Heyward, M and Heyward, P, Dingley Dell Pork website, 2019).*

This concept was shared as a cultural value throughout the whole enterprise in the author's observation, not just by the owners or managers. In the USA, operations staff who carry out duties such as marking cattle could highlight their company's brand values and name some of their flagship clients as effectively as any of the senior staff.

Current Australian Farm Institute Chair and outgoing Australian Pork Limited CEO, Andrew Spencer summed up this intent well in his feature in the Australian Farm Institute newsletter in August 2019:

Innovation Generation:

Farmers on average are a very resilient bunch, but one man's resilience is another man's stubbornness. Farmers are great at what they do, but what they do has traditionally been all about production and not much about consumption. This challenges our ability to objectively look at the value mix of different investment options for the future of our industries.

The new generation of farmers seem to better understand the power of the consumer than the 'old guard' and are prepared to shift production models to generate greater value in the eyes of their target market. This shift might take the form of working to imposed standards around animal welfare, environmental impact or eating quality that can support brands with premium claims for the ultimate consumer products.

To accomplish this shift from a production to consumption focus, investment, innovation and (most of all) a willingness to change are required. Some farmers see the shifting consumer preferences as a threat to their past identity: "this is the way we have always done it and it's stood the test of time". Maybe so, but if giving consumers what they want makes for a better future business, why not do it? Changing the way we produce our food and fibre to be more aligned with consumer preferences is not appeasement; it's good business. (Spencer, A, Australian Farm Institute Magazine, 2019)

2.4.3 Challenge: access to processing as a service

Consistently across Europe and the USA, branded beef programs stated that their biggest challenge in operating a successful branded beef program was gaining access to processing as a service or access to more capacity with their service processor to scale up their business.

Most organisations tended to process with large modern plants to ensure state of the art processing and packing for quality and shelf-life or access to export accreditation. This challenge is one the author is all too familiar with, having access to the only processor who would take on a start-up program, at the time, located interstate – some 14 hours by truck from the farm-gate. The author repeatedly requested processing space from April 2019 to October 2019. As a consequence of significant destocking from severe drought there was simply no space available, so there was access to cattle and customer demand yet no ability to turn cattle into beef due to this constraint.

The Fitzroy Basin area where the author is based has more cattle than all the Northern Territory, as well as more cattle than all of Western Australia at 2.2 million head. There are four major processing plants within a four-hour catchment, yet none of them provide service processing for mid-size producers with a branded beef offering for domestic or export markets. This is the single biggest challenge in the business to date and not unique to Australia but reflected in the processing industry landscape in much of the UK, parts of Europe and the USA. Solving this problem is a clear opportunity for the promulgation of successful niche and premium brands and

is in keeping with Australia's national brand proposition to trade on a quality "clean and green" reputation in export markets.

When asked about whether mobile processing, which is recently introduced in Australia, might be a potential solution, the businesses interviewed said they simply could not cope with demand, nor did they have the post-slaughter facilities, quality and capacity of machines such as high-end vacuum packaging needed to ensure confidence in food safety and shelf-life or the ability to be export accredited. Most brand owners seemed a bit despondent as they felt they were at the mercy of the market; capital investment and operating obligations to vertically integrate are beyond their budgets or desires, yet they still needed more. None of them offered any solutions to this challenge other to invest in preserving and maintaining their existing processor relationships at all costs.

Chapter 3: Provenance

3.1 What is provenance?

When humans meet, they often seek to find out where each other are from and "what's their story". The same can be said about brands and products and the notion of their "provenance". The word provenance itself is derived from the French 'provenir', meaning 'to come forth' or 'originate' and it largely covers "what's the story" behind this brand or product. Notably, the noun provenance has seen a significant increase in its usage in our language since 1885 and is one of the 10,000 most used words in the English language (Collins Dictionary, 2019).

3.2 Categories

The writer believes that provenance can be segmented into one or a combination of the following categories:

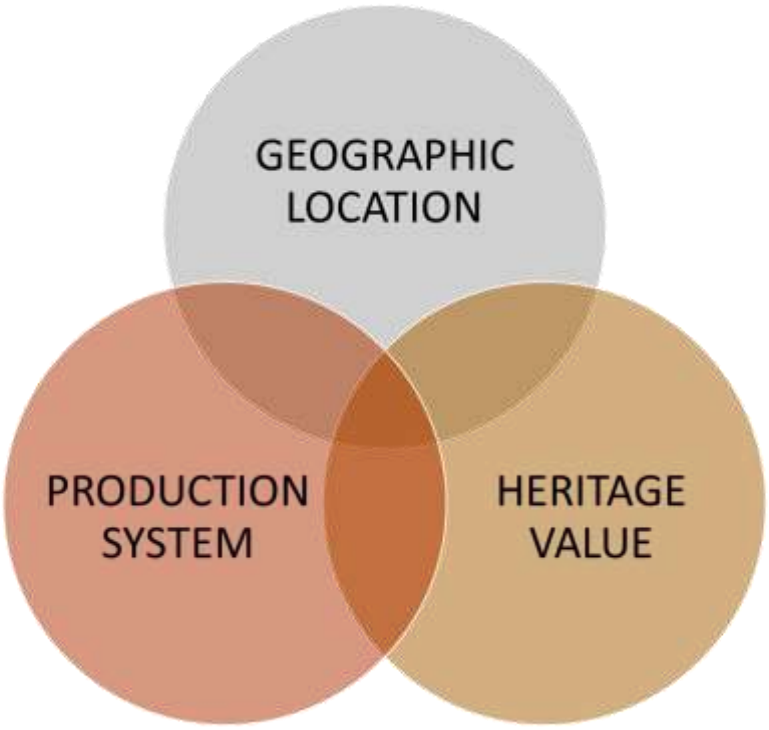

Figure 8: Provenance Model for Beef Production, (Comiskey 2019)

3.2.1 Geographic provenance

Geographic provenance describes the origin of a product based on geography or regionality, such as Loch Fyne Oysters in Scotland, where the quality of the water the oysters are grown in is directly correlated with their eating quality. The location has become synonymous with high quality seafood. Another example is seen with "single estate" status in the UK. This term is not officially defined by industry – essentially, it means that the key inputs to a value-added product such as spirits, were grown on the same farm as the processing occurred. The writer observed this at the Chase Distillery in Herefordshire where potatoes and apples are grown as base ingredients for production of their range of premium, award-winning vodkas and gins.

Additionally, a well-known identifier of geographic provenance is the Scotch Beef Protected Geographical Indication (PGI). PGI is an EU scheme to protect and promote high quality traditional and regional food products unique to a geographical area. This provenance indicator denotes "*…whole chain assured beef from Scotland*" *"…from specific animals that are sourced from selected Scottish farms, adopting best practice which includes animal welfare and natural production methods*."

The writer interviewed a retail service person at the meat counter in the famous Harrods Fresh Food Hall and he stated that "*…people generally don't come in asking for a branded product unless they have seen it promoted by an influencer like a celebrity chef, but they all want Scotch Beef because everyone thinks it's the best for you and the best eating*." He also said that "*…everyone will pay for provenance. They want to know the story behind the product and they are prepared to pay more for the perceived value of the product without question*" (pers. comm., Harrods employee, 2019).

Figure 9: Scotch Beef PGI meat in the display at Harrods in London. Cost equivalent to approximately $14 AUD each as at Oct-2019 (Source: author)

3.2.2 Production system provenance

Production system provenance relates to the production system in which the product was grown and generally the writer found that this tended to align with consumer's personal values around

perceptions of personal health, nutrition, animal welfare and environmental stewardship. An example of brands that primarily trade on *production system provenance* values was beef carrying the "Pasture for Life" symbol in the UK. The Pasture-Fed Livestock Association "*champions the virtues of pastoral farming, providing a distinct identity for systems where animals eat only grass and forage crops their entire life*" (Pasture-Fed Livestock Association website, 2020).

Some factors of the production system appeared to be becoming 'the norm' or an improved industry standard. Most of the premium brands visited as part of this research incorporated some values associated with the production system in their brand, though it was an element of their overall brand provenance, not the key discerning factor. Examples include terms like sustainable (though there is not a clear common understanding of what this means), animal welfare, regenerative, low stress, and 'never ever' claims around use of things like antibiotics and HGPs. An example of this is Heartbrand Akaushi Beef in the USA, who trade largely on their heritage provenance (breed-based) platform. They additionally incorporate production system provenance claims (secondarily) such as HGP-free, antibiotic free and fed on a 'vegetarian-only diet', that is, feed rations do not contain animal-derived tallow.

Another example of production system-based provenance, which attracts a considerable premium is Dingley Dell Pork in the UK. Their pork is pasture-raised and described as 'welfare friendly', particularly in relation to the animal-human interaction. This claim was quite unique in the writer's experience; however, parallels could be drawn between the low-stress emphasis in the Dingley Dell pastured pork production and the application of Dr Temple Grandin's low stress beef handling techniques she lectured about at the American Meat Science Association's Reciprocal Meat Conference in June 2019. This trait in the Dingley Dell production system was in stark contrast to similar animals from a nearby 'celebrity farm' visited on the same day, where the animals were animals appeared highly defensive and under duress.

3.2.3 Heritage provenance

Heritage provenance can be described as that associated with breed, history or even simply, 'brand story'. It was mostly observed that breed-based heritage provenance was the most common. An example of this is Glenarm Shorthorn Beef in Northern Ireland. In a marketplace dominated by characteristically high yielding, low fat cover, low IMF beef such as Limousin breed combinations – this brand set themselves apart by utilising higher marbling, heritage breed carcases which come with the claims around 'better eating quality' we commonly see in Australia. The switch from euro and euro-cross cattle, which dominate their local market, which is heavily focussed on production yield, came about as a result of their direct customer experience.

Built in 1636, Glenarm Castle is the home of Viscount and Viscountess Dunluce and family. A source of revenue for the estate is through corporate venue hire and other high-end events. Glenarm Estate provides catering for these events from their own produce, particularly featuring the beef and salmon produced in the grounds. Customer feedback on their beef indicated it was not producing a high-quality eating experience. To improve the offering the estate collaborated

with a local university to find a traditional breed best suited to their region, with a distinct flavour and a simpler management system than their continental system. As a result, they selected the Shorthorn breed and have invested in genomic data to go with it. They grow their own supply, as well as collaborating with an extensive supplier network across Northern Ireland. Furthermore, they tap into a production-type provenance secondary marketing characteristic by dry aging the product with renowned processor Hannan Meats using their Himalayan salt-aging process (pers comm. Morrow, A. 2019).

Another example of breed-based provenance is Heartbrand Beef, USA. This producer-led American brand was founded by fourth-generation cattle ranchers Ronald Beeman and Jordan Beeman. They aimed to make an impact on the US domestic market by *"bringing exceptionally delicious and healthy Japanese Akaushi beef to American consumers"* (*heartbrandbeef.com, 2020*) and they set themselves apart from other brands based on both perceived taste and health benefits unique to their Japanese Akaushi breed of cattle. Heartbrand produce source-verified Akaushi beef under rigorous quality guidelines and certified product testing. They also collaborate with suppliers (in a similar fashion to Glenarm Shorthorn Beef) and most of the cattle are finished at Bovina Feedyard in the Texas Panhandle, USA on a 'vegetarian feed ration'. Heartbrand are also an example of a seedstock producer influencing the genetics that contribute to their branded beef program with buy-back arrangements in place for offspring from their bull sales, within quality-based criteria (pers. comm. Carrales, J. and Beeman, J. 2019).

The final example of heritage provenance in action is La Granda, an Italian company who specialise in the production of heritage Piedemontese beef, both in Europe and for export markets. A classic 'triple purpose' (draught, meat and milk) heritage European breed, the Piedemontese cattle were almost wiped out in the mid-twentieth century. At the beginning of the 1900s there were an estimated 680,000 of these cattle in Italy; by 1957, the number registered in the herd book was only 851. In 2011, the total number of Piedemontese cattle were estimated at 2,768,243 (Wikipedia, 2020). This mirrors a similar slump in another French triple-purpose heritage breed, the Bazadais, in the Bordeaux region of France where some 700 cows remained in their 1970 stud book circa, after 60,000 head were estimated to be located in the region at the start of World War II (Wikipedia, 2020). Piedemontese cattle are one of the few breeds in the world to be "double muscled", having a mutation in the myostatin gene. They are produced under a strict, member-based standardised quality control system. This requires compliance with PGI, Slow Food and Agricoltura Symbiotica criteria. Agricoltura Symbiotica is "*a new method of agriculture and breeding based on respect and enhancement of symbiosis between the actors of the food chain: ground animals and men…*" (agricolturasimiotica.it/en, 2020)

Figure 10: Piedemontese producer near Genola, Italy 2019 (Source: author)

La Granda is a Piedemontese-branded beef program which works in collaboration with Eataly, a high-end Italian marketplace comprising restaurants, food and beverage counters, bakery, retail items and cooking school offerings. They also collaborate with Slow Food, founded in Italy with a focus on the promotion of local food and traditional cooking. Piedemontese cattle are known for their exceptional meat yield, in some cases dressing over 70% and the beef is characterised by an extraordinarily leanness, with low levels of connective tissue and fat (pers. comm. Trigale, S, 2019). At the same time, the meat is very tender and often used in a raw beef dish similar to a steak tartare that uses traditional continental-style lean and tender French breeds.

It was observed that, in general, heritage provenance values garnered the greatest premium for brand programs. Producers supplying cattle into the value chain were being paid at least 20% above market commodity price. Some brand programs pegged this premium to the variable grid price where others, such as La Granda established and agreed a fixed price in advance.

3.2 Provenance value

Retail margins were often considerably skewed when comparing 'commodity product' against 'branded product'. To put this into content, a Tesco Supermarket beef patty retails at approximately $2.45AUD each in London. However, a Scotch Beef PGI beef patty retails at approximately $14AUD each at the Harrods Fresh Food Hall in London. The boutique French breed *la race Bazadais*, which is PGI Red Label, trades at around a 40% premium on the more commonly found French *Charolais* breed – which would be considered their baseline commodity beef (pers. comm. Lapoujade, M. 2019).

The writer believes that, with sufficient consumer driven research, it may be possible to ascribe certain value weightings to the different elements of provenance. These differences could determine that the premium that each product might attract in the market. This could be done for various segments of the market (e.g. butcher trade, foodservice, retail) in different countries and locations. A similar concept was recently floated by Warwick Powell, chairman of Australian technology platform BeefLedger (Powell, 2019).

The writer did not observe any such customer-led design principles being utilised to validate a value on 'what price provenance'; this might be an opportunity for brand programs investigate to see where the greatest ROI might be achieved.

Furthermore, an additional key learning was that quality is equally important to people. The successful players invested heavily in ensuring the highest quality in production, processing, distribution and marketing. They were deep in their descriptions the components of speciality and premium which determined their individual product ranking. They had a fundamental mind shift away from "commodity thinking" and were able to harness the power of customer-led design principles and value-chain thinking to connect with their customers, developing a rapport and garnering a premium for their product.

Chapter 4: Distributed ledger technology

Looking at collaborative value chains and provenance, it seems logical to examine technologies which could influence the pricing mechanism in future markets.

4.1 What is distributed ledger technology (DLT)?

This report will only touch on a couple of important differences between conventional technology and distributed ledger technology, focussing on its application in relation to value chain collaboration and provenance.

Where most technology relies on a **single central ledger** to hold all the data, distributed ledger technology has **no** one central ledger. Transactions, verified by multiple parties form the '**blocks**' like sausage links in the chain attached to the product and multiple, synchronised versions of this ledger are held through a distributed network creating an almost immutable record. Access can be granted to all or some blocks of transaction to provide information to third parties (Figure 13).

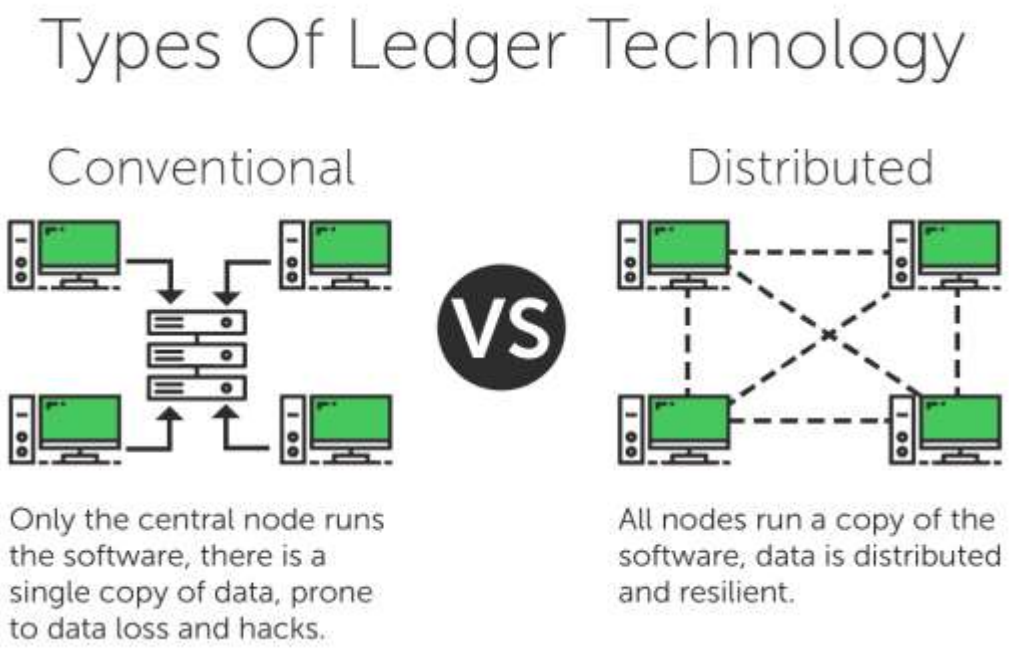

Figure 11: Types for Ledger Technology, Centralised vs. Distributed (CryptoManiaks, 2019)

4.2 What is Blockchain?

Blockchain is a decentralized, distributed, and frequently (but not necessarily) public, digital ledger that is used to record transactions across many computers so that any single record cannot be altered retroactively, without the alteration of all subsequent blocks. This allows the participants to verify and audit transactions independently and relatively inexpensively. A blockchain database is managed autonomously using a peer-to-peer network and a distributed time-stamping server. Blockchain was invented by a person or people known as Satoshi Nakamoto, circa 2008 and it is the technology that enables the cryptocurrency, Bitcoin.

All Blockchains are DLTs but not all DLTs are built using Blockchain technology. Blocks hold batches of valid transactions that are hashed and encoded into what is known as a Merkle tree. Each block includes the cryptographic hash of the prior block in the Blockchain, linking the two. The linked blocks form a chain, hence the name Blockchain. This iterative process confirms the integrity of the previous block, all the way back to the original genesis block. One of the key advantages of the Blockchain and DLTs is this function that creates a practically immutable and linked chain of data, building trust in this system of validation.

DLTs are gaining traction in the business world, with the Australian Stock Exchange (ASX) having commissioned the development of a Blockchain-based system to replace their aging CHESS system which currently handles some AU $2 trillion in registered equities along with AU $5 billion processed per day. This new DLT system is anticipated to be fully implemented by spring of 2021.

4.3 Why is it DLT important to the Australian beef industry?

There are several reasons why DLTs are important in the Australian beef industry context, including:

- Preventing food fraud
- Enhancing international trade, and
- Facilitating provenance claims (redistribution of value).

4.3.1 Food fraud

Food fraud has been estimated by Price Waterhouse Coopers (PwC) Australia to be a $65B per annum problem. They further assert that for every kilogram of Australian beef imported into the Chinese market, one kilogram is counterfeited and falsely presented as Australian beef (pers. comm. Heraghty, C. PwC at Beef Australia 2018). Given how heavily leveraged the Australian industry is into export markets, this represents a significant problem with considerable scale and the potential to cause consequential damage to its reputation. It certainly is a problem rife across the world. The author identified three cases of food fraud in as many days during her visits to Austin, Texas and Brooklyn, New York in the USA. The use of a DLT to create a trusted platform with a single version of validated “truth” is a significant opportunity for addressing food fraud issues. Currently there is a gap between traceability linked to a body of beef through NLIS tag unique identifiers and to a box of portions from various animals and to a piece of prepared meat, say served in a restaurant. PwC Australia recently launched their Food Trust Platform with the inclusion of biological marker technology to create unique signatures on the meat itself that can be used to verify authenticity. Other organisations such as BeefLedger Australia utilise GPS tracking and ‘smart locks’, all of which have their data captures and indelibly recorded in their Blockchain based systems.

4.3.2 International trade

The Australian beef industry is heavily leveraged into the international market with some 70% or so of beef production for those markets annually. One of the challenges of international trade is

security of payment, payment terms, additional time imposts on limited shelf-life product and impacts on cash flow and the 'leakage' of costs assigned to various agents and other parties in the payment chain (Figure 12).

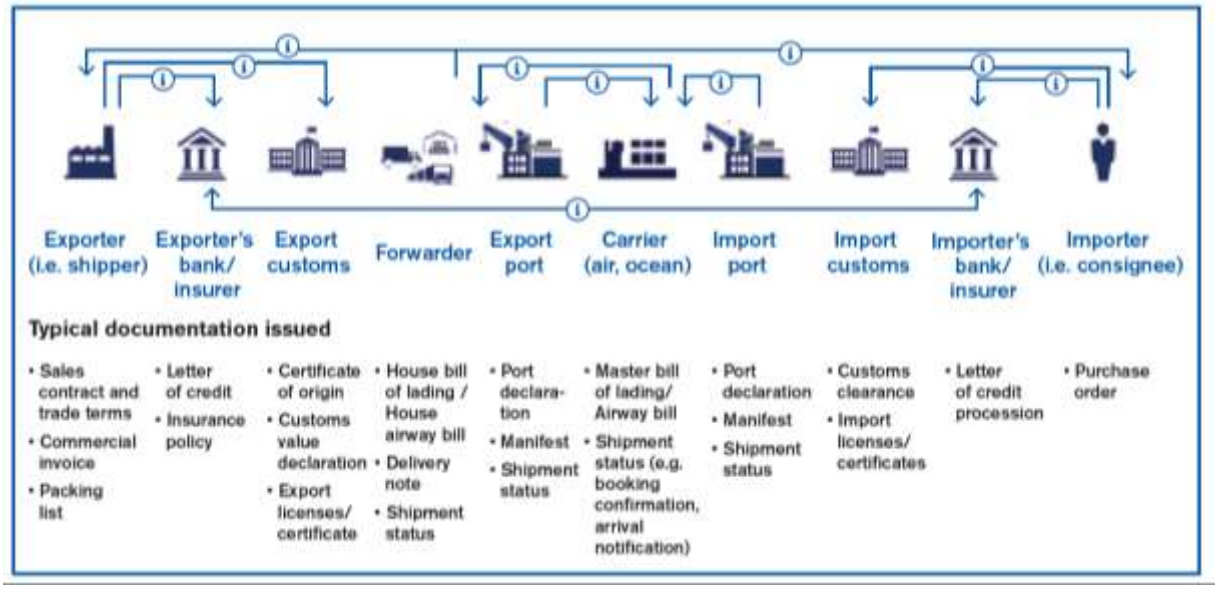

***Figure 12: Typical International Trade Documentation Issued* (*Source: Ganne, World Trade Organisation 2018*)**

4.3.2.1 Smart Contracts

Rosic 2016 explains *Smart Contracts*; "*A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract"*. Smart contracts allow the performance of credible transactions without third parties. One of the best things about the Blockchain is that, because it is a decentralized system that exists between all permitted parties, there is no need to pay intermediaries ('the middlemen') and it saves time and conflict." He went on to attribute the term Smart Contract to Nick Szabo, "*a legal scholar, and cryptographer who realized (in 1994) that the decentralized ledger could be used for smart contracts, otherwise called self-executing contracts, Blockchain contracts, or digital contracts*.

*In this format, contracts could be converted to computer code, stored and replicated on the system and supervised by the network of computers that run the Blockchain. This would also result in ledger feedback such as transferring money and receiving the product or service." (*Rozic, A, BlockGeeks, 2016)

With the majority of the Australian beef industry leveraged into the export market, there is a significant opportunity for efficiencies to be gained through the adoption of smart contracts stacked into a DLT-enabled value chain. It is important to look at both the application of DLTs as a big picture strategic change, and not just a short-term gain for consumer trust.

4.3.3 Provenance and proof of brand provenance

Public and private transparency has become critical, providing a link back to the earlier discussed concepts of a two-way street for value chain collaboration and provenance. The question becomes – what do we want to tell consumers and what do consumers want to know?

The use of DLTs offers brand owners the opportunity to capture all the steps in the value chain from conception to consumption. But do consumers really want to know everything? The author thinks not. In fact, this is where customer-led design really delivers value, because brand owners need to establish what is it that consumers need and want to know about their product in order to verify the claims around factors such as eating quality, heritage provenance, environmental and welfare management, origin. This enables brand owners to price consumers' desires and garner a premium based on this correlation.

DLTs enable brand owners to allow some, or all, relevant data captured in the value chain to be accessed as required. Some DLTs are focussed on food fraud in terms of traceability, but traceability is ultimately a component of provenance, and it is in establishing a trust-based system of evidence through DLTs that brand owners can verify their brands.

4.4 What is happening in branded programs globally with DLT?

The writer saw little adoption of distributed ledger technology in the field when looking at branded production programs. There was only a low level of understanding of DLT and its possible benefits. The best example was the London-based *provenance.org*. Spearheaded by CEO and Founder, Jessi Baker, the key message the writer distilled from an interview with her was:

> *"It is literally our organisation's mission to de-commoditise the commodity" – Jessi Baker, CEO & Founder, provenance.org* (March 2019, UK)

If provenance can be captured and shared which makes a brand 'premium' – can a value be correlated with this? If so, can a value (price) be placed on provenance in its various forms. It is possible to take a 'reverse engineering' view by looking from the customer's perspective about what and how they value provenance, establishing how it can be captured and ensure this provenance drives the type of beef produced. This might mean changing a production system to grain-finish for carcase quality and consistency or start to use DNA to verify claims to heritage provenance, or switch from HGP to HGP-free. The most important shift will be away from being a cattle producer, to being a customer-focussed beef producer.

4.5 Constraints

Distributed ledger technology on its own is not a silver bullet or even a solution – it is a platform to access applications that provide business efficiencies and added value that are the key for success. For example, the author does not understand the technology that makes smart phones work, but understands what applications can be utilised through this platform and how they add

value to business. Similarly, this level of understanding is sufficient to evaluate how DLTs fit into the value chain and brand proposition.

A lack of a consistent data format is a challenge for those currently looking to access and capture data from sources such as meant processors, particularly if capturing data in a format that brand owners require for DLTs is not seen as a commercial proposition.

The current set up of line processing in the boning room does not provide for this level of detail, with individual NLIS identification lost as soon as portioning commences. A box of cube rolls or trim does not identify individual animals but restricts details to the "lot" that was processed. Even if it did – do consumers want to know this much information at this level of detail and how does the consumer access this information from their restaurant table? There are still some fundamental customer-led design issues that need to be worked through to adopt a trust-based system of credentialing beef.

4.6 Opportunities

The implementation and uptake of distributed ledger technology is further behind than the author had expected, from industry interest to research to practical work. While the opportunities are massive and do have potential to reshape the way products are produced and distributed, there has been some hesitation to adapt and adopt. While a part of this may be attributed to the fragmentation mentioned above, there is also an understandable slowness to move to new ways of working and to adopt technology that is still considered cutting edge, particularly within a vertically integrated market that has traditionally been slow to embrace change. However, this reticence does mean that there are still a range of opportunities that are open to adoptees and advocates of DLT.

4.6.1 The creation of a premium product

By using a premium technology that can verify and support both quality and source, the industry should be able to create a premium product. Rather than simply reserving the profits and status of this premium, it should be shared throughout the value chain, providing every participant with the opportunity to increase their own worth and participate in a growing valuation. The provable premium of a DLT-backed product could raise the value of an entire industry, providing more opportunities for growth and profit for every element.

A part of this premium would build on the provenance and brand story; however, there will also be a strong premium opportunity in the way that product can engender trust in a community who are becoming more focused on where their food comes from and how it reaches their plate, and in what condition. This is particularly true of markets such as China, where imported beef - particularly from Australia - commands a higher price, where being able to prove the country of origin becomes crucial. To benefit from the higher demand for Australian provenance, there needs to be a provable chain, and where that is achievable through DLT, the premium reputation of the product will only increase.

4.6.2 A better approach to every transaction

DLTs are a way of connecting, interlocking and verifying each point of the supply chain. They also represent an opportunity to better manage payments and transactions. The immediacy of the chain and the trust factor at each signing point means that suppliers and distributors should be able to immediately see and understand their part in a transaction and be able to complete and confirm payments in a streamlined and timely manner.

If the distributed ledger shows that a particular lot of cattle has been verified as arriving at a processing facility, the owner of that lot will have no issues in releasing payment to the relevant shipping and transportation services and will be prepared to follow through on their payment to the processor upon receipt of their signature showing that processing has been completed. This provides for a greater level of confidence across the value chain, and it means that the financial relationships of the industry will strengthen collaboration and allow for closer partnerships.

4.6.3 Increased transparency and consumer trust

In a more socially, environmentally and health-conscious world, consumers are more invested in their food choices and are increasingly more informed about what they eat and why. With communities starting to take notice of the value chains that support their diet, there is a need for producers and suppliers to be able to show a degree of transparency that supports consumer decision making by enabling easy access to data instead of obscuring it.

While there is no need to overwhelm the consumer with too much information to a degree that it becomes debilitating, there is a simplicity in DLT technology that can be communicated to purchasers and consumers with a new level of immediacy and real time accuracy that will allow them to see inside their food’s value chain like never before.

Conclusion

One key observation during this study is that most producer-led brands are born out of adversity, and it is vital for beef and related businesses to ensure they do not wait for the perfect storm to be upon them. Though it is potentially a controversial comment, the author believes it would not take much for the Australian beef industry to see a repeat of the past crisis of the live-export ban on cattle, or a biosecurity impact on a market that a primary production business relies upon. It is more a matter of when than if.

The Covid-19 global pandemic that started in 2020 has demonstrated the critical impact of being heavily invested into a single or limited market, with suppliers to single food service brands providing the perfect illustration. For example, the author was poised to launch a food service and export brand, *Epicurean Beef*, in March 2020. Due to the impact of Covid-19 on the food service sector, this beef had to be diverted to *Southern Cross Beef*, a regional provenance brand which enjoyed a successful launch, with retail butchery spiking between 300% and 500% above 'normal sales' during the same month. This illustrates the importance of diversifying the value chain.

Enterprises should be taking the time to evaluate their risk profile and explore the alternatives now. Operating or participating in a branded beef program may represent a hedging of risk in an inherently risky industry.

There is certainly a bright opportunity in the Australian beef industry for the promulgation of producer-led branded beef programs. Demand in both domestic and export markets continues to be strong and selling branded product is not the hard part. A priority should be finding the appropriate niche to meet customer needs for a product they want and establishing in those markets in a collaborative value chain.

The biggest challenge and the greatest barrier to entry and blockage for the development of producer-led beef brands in Northern Australia – particularly Queensland – is lack of access to service processing facilities. Investment in smaller, more agile, technologically enabled and environmentally friendly plants needs to happen as a matter of priority to replace a continued focus on retrofitting ageing mega-plants.

Industry should lobby all levels of government to facilitate the enabling conditions that lend favour to the private sector investment in the development of processing facility capacity. Locations should be considered in terms of production catchments and environmental conditions. Government policy could facilitate access to infrastructure such as road, rail and air freight, and the development of associated industries such as feed lots or potential for urban growth and development. All these factors would reduce the potential risks faced by new processing industries.

Government policy could also provide creative tax arrangements, development incentives, loan and grant arrangements as well as fast-tracking of projects as being of state and regional economic development significance. A focus on circular economy and automation should be encouraged to ensure the efficient application of resources and sustainability with the high cost of energy and labour in current and forecast market conditions as well as an opportunity to avoid the challenge traditionally faced in attracting human resources to staff these plants.

And finally, though it may seem no surprise, a key learning from this study is that ***people do business with people*** as evidenced by brands such as Glenarm Shorthorn Beef in Northern Ireland, Chase Distillery in England, Heartbrand Akaushi in the USA, and Dingley Dell Pork in England. These brands all demonstrated a clear understanding of the importance of human relationships, customer experience through emotional connection and trust in the marketing of their product. This principle must always remain at the forefront of an organisation's thinking from all perspectives of business to be successful in the niche, premium end of the market.

"The journey from a productivist approach to animal agriculture (where more from less is the single-minded aim) to a consumer-driven quality approach (in which value is added through building a relationship around how the product was produced) is a bumpy road. But it is one worth treading if we believe our future lies more in the realm of value than that of cost" (Spencer, A, CEO of Australian Pork Limited in the Australian Farm Institute newsletter, 2019).

Recommendations

1. Service processing access needs to be established in strategic locations, as this is the single greatest barrier to entry and blockage for the development of producer-led beef brands in Northern Australia, particularly in Queensland.

2. Producers should assess their business risk in terms of how much they are leveraged into single or limited markets and examine the potential for branded beef program development now. Do not wait for adversity.

3. Cultivate mutually beneficial relationships to identify and establish partnerships and other collaborative trading arrangements in the value chain. There must be a win – win, based on sharing risk and reward.

4. Build experiences to create an emotional connection with branded beef programs. Explore the adoptions of immersive technology and visitor infrastructure to do so.

5. Consider adopting or trialling Distributed Ledger Technology, such as Blockchain, to credential beef brand provenance value through a system of trust.

6. Be a 'small giant'. It is not necessary to go big to be great. Producers can be small and top shelf, running profitable and entirely satisfying branded beef businesses. Scale does not necessarily equal success.

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Plain English Compendium Summary

Project Title:	The Business of Branded Beef
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Objectives	To examine factors affecting the following aspects of the agri-food value chain and identify opportunities for application, both personally and across industry, such as: • Collaborative value chains to achieve commercial scale for premium beef brands into niche segments in the domestic and export markets. • Branding and marketing of premium niche beef brands, particularly telling the story of heritage provenance value connecting consumers to producers. • Application of distributed ledger technologies for credentialing beef brands and possibly unlocking opportunities to adopt new ways of doing business
Background	There is little support or information in the beef industry for the development and implementation of producer-led branded beef programs, particularly the various models for collaboration across value chains. Whilst branded beef is emerging as a significant opportunity for Australian producers, little research has been done around the value of the various types of provenance for beef supply to brand owners. Similarly, little information is available to producers about the potential for adoption of distributed ledger technology and how it might be leveraged for branded beef programs from the points of view of improving commercial outcomes and consumer trust as well as reducing risk.
Research	Visits to The Netherlands, Japan, Singapore, Philippines, Israel, USA, Switzerland, France, England, Scotland, Ireland and the UK, meeting with individuals and organisations that form the agrifood value chain for numerous commodities, not exclusive to the beef industry.
Outcomes	Similar challenges exist across Europe and USA for branded beef producers, particularly in relation to issues around service processing and how livestock is sourced and produced within the value chain. Similar opportunities exist in relation to the incorporation of customer-led design, relationship-building though experiences and the adoption of technology. Uptake of agrifood-tech solutions remains low, but value is perceived favourably.
Implications	It is possible to have a successful, profitable and sustainable producer-led branded beef business that delivers personal satisfaction through brand value, customer and value chain engagement and returns a premium for the perceived value to the market.
Publications	Nuffield Australia National Conference 2019 – returning scholar presentation.