‘Prime vs. Bull’

Making more cents out of the Beef Industry.

A report prepared for the Kellogg Rural Leadership Programme
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Executive Summary:

The New Zealand (NZ) beef industry traces its origins back to the first European arrivals to NZ. While cattle were initially used as draught oxen to provide food and for the purpose of improving pastures, they are now a major source of export income for NZ farmers. Today NZ exports chilled and frozen table and manufacturing beef to the major world markets, with the majority of production going to either the manufacturing market of the United States (US) or high value markets in Asia and Europe.

On-farm, farmers make a decision every year as to what class of livestock they will finish over the following 12 months. The traditional beef system has been to retain castrated male and female calves from beef breeding herds, with stock then finished and sold as 'Prime' beef. Since the 1970's, farmers have developed and maintained the bull beef industry, with male calves retained from the dairy industry for finishing and export, predominantly to the US market. Given that the product from both types of animal are exported to similar markets, the report findings indicate that it is the same external market forces which impact the returns to NZ farmers.

This report explores the major challenges in supplying beef to the world market and the external forces at play. It also investigates the future market outlook for NZ beef, the challenges and opportunities that the beef market faces, and how farmers can best take advantage of these.

The main findings of the report are:

- NZ beef production accounts for approximately 8% of cross-border trade making NZ one of the largest beef traders in the world.
- Approximately 50% of NZ beef production is exported to the US market as both primal cuts and manufacturing type beef, illustrating the reliance of the industry on this major market.
- There is a significant amount of work being undertaken both by industry (Beef & Lamb), Government and processors to expand the market for NZ beef and improve prices paid to farmers for livestock. This includes generic provenance marketing, Free Trade Agreements to achieve better access for NZ beef into high value markets and specialist breed based marketing programmes.
- Farmers elect to farm either Bulls or Prime Heifers & Steers, or a mixture of both. The report findings indicate that farmers are best to farm stock suited to their specific farming operations rather than "farming for the market".

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1. Introduction:

"The past year has been a fantastic one for beef farmers. Prices have hit record levels driven by the United States' manufacturing beef market (Countrywide Beef, May 2015)." There have been a number of farmers who have been able to take advantage of the record rise in prices by having the 'right' stock on their farms at the 'right' time. For many of these farmers it will have offset a number of years of poor returns, and with the increase in prices which occurred in October and November 2014 it has also rewarded farmers who carried stock through the winter. In addition, farmers who have previously grazed dairy animals have been given an opportunity to reassess their business direction.

"For the New Zealand (NZ) beef farmer, deciding on a business direction, developing, and successfully implementing a strategy is critical for future success. Gathering information on future trends and issues is an important part of the process to ensure appropriate capabilities and contingencies are developed (McIvor, 2003)." The NZ Beef Industry produces both prime and manufacturing beef for local consumption and export to the world market. NZ produces only 1% of world beef production, however annual beef exports account for approximately 6% of the traded volume (Morris, 2013). The industry was initially built on the processing of prime NZ beef for export to the world markets, however since the early 1970's there has been a significant number of bulls (predominantly sourced from the dairy industry) slaughtered for provision of manufacturing beef. This is due to the low fat content of this beef which is suited for predominant use in the North American "hamburger" market.

The following report explores the opportunities and threats to the beef industry and how farmers can take advantage of current trends. It looks at whether there is greater opportunity for finishing "Prime" steers and heifers, or in focusing on "Bull or Manufacturing" beef through animals that can be sourced from the dairy industry. Issues faced in farming both these types of animals, and the systems that may be able to increase the practicality and profitability of each exercise are also investigated.

In researching this topic, input from a range of industry participants including farmers and meat company operators has been sought. A range of literature has also been reviewed and reflected upon including previous Kellogg reports, to ascertain what information is currently available, and this material has been referenced throughout. The primary objectives of this report are to identify the

opportunities and challenges that the NZ beef industry faces on a global stage and how NZ farmers can structure their businesses to take advantage of these.

This report has been collated from a literature based review of farming journals, published papers and previously published research reports. The vast bulk of these are publicly available research papers from the NZ Grasslands Society and the NZ Animal Production Society. I have also endeavoured to use relevant information from both Beef & Lamb NZ and the US Department of Agriculture to illustrate relevant trends. The report has also provided an opportunity to engage the meat processing industry including Greenlea Premier Meats, Silver Fern Farms and Alliance Group to better understand the beef processing industry, the opportunities and challenges they see the industry facing.

2. Background to the Beef Industry:

The first beef cattle were landed in New Zealand in 1814 by the Reverend Samuel Marsden at his mission station in the Bay of Islands. However it was not until the 1840's that beef cattle became more common throughout NZ. Cattle were considered to be useful for their hardiness and ability to survive on rough pastures. They were largely used to graze regenerating bush areas and the areas which were swampy in nature, predominantly to maintain and improve the pastures for sheep which were more highly valued. Beef cattle have generally been the 'poor cousin' to the sheep and dairy industries. While sheep were valued for their wool and the ability to export dairy products popularised milking cows, the late 19th and early 20th century saw beef cattle being used mainly for domestic consumption (meat, horn and hides), with some canned or boiled down for tallow and the proceeds then exported.

The late 19th century saw the invention of refrigerated shipping with the first load of NZ mutton leaving on HMS Dunedin in 1882. This opened up the opportunity for the start of "export" beef with a small number of carcasses sent to Britain for sale in the Smithfield markets. While this was profitable for lamb and mutton, beef proved to be more difficult due to the competition from North and South America who had much lower transport costs. NZ beef continued to be predominantly used for domestic consumption with a small amount exported mainly to Britain through the early and mid-20th century, predominantly as frozen "quarter beef".

The first boxed beef was sent to the USA in 1958, with the advent of further processing and more 'primal cuts' as consumers tastes changed and their awareness of higher value steak cuts increased. This allowed costs to be reduced with the low value bone taken off and rendered, while the higher value beef was exported. Despite the change in consumer requirements, NZ continued to export a significant volume of quarter beef, predominantly to the South Korean market where further processing was undertaken until the late 20th century.

Following the admission of Britain to the EU in 1973, NZ faced an immediate rise in tariffs to what had previously been a major market for our exports. This led to a change in focus with the US market becoming more important, although existing trends continued in which a majority of NZ beef was exported to Asia during this period. It was the early 70's that bull beef farming was introduced to NZ as a small number of pioneers recognised the opportunities that the dairy industry was providing. This created an opportunity to send manufacturing type beef to the US market. NZ

continued to concentrate on sending quarter beef carcasses to South Korea where they were further processed with markets established in Japan, Taiwan and China.

Since the start of the 21st century, NZ has continued to export beef to a range of countries around the world with a focus on the US and Asian markets. A move from sending quarter beef carcasses to exporting boxed chilled and frozen beef has also occurred. There is a real focus on ensuring that NZ exports top quality beef, with processors working on a range of different initiatives to ensure a differentiation of NZ beef in the market place. This has been progressed through identifying and marketing different breeds, grass vs grain fed animals, and animals that have an antibiotic free history. With the world's more affluent consumers becoming more savvy and prepared to pay higher prices for quality product, there are bound to be some great opportunities for NZ beef in the coming decade.

3. Markets:

When the NZ beef industry started in the late 19th and early 20th Centuries, the majority of beef was consumed domestically, with a small amount exported to the United Kingdom (UK). However as per the "Background to the Beef Industry" section above, the markets for NZ beef changed towards the middle of the 20th Century with North America becoming an increasingly important destination. The markets shifted further to the East in the late 20th Century following the initiation of Halal processing, with Asia now accommodating a greater proportion of NZ beef exports.

NZ is one of the largest beef exporters in the world, with world markets also dominated by other major producers including the US, Australia, Canada, Argentina and Brazil. While the other major beef producing nations have a significant domestic market, NZ is unusual in that 83% of cattle slaughtered in NZ are sold as export beef (Beeby, 2003). This in turn makes NZ farmers more reliant on the position of world markets to determine the price paid. Despite NZ accounting for only 1% of global production, it accounts for roughly 8% of cross-border trade (Beeby, 2003) making the small country a relatively major player on the world stage.

United States:

The majority of NZ's beef production is exported to the US where despite a large domestic herd they are still the major importers of world beef. US beef production focuses on cattle finished on 'finishing lots' where they are fed on vast quantities of grain. This produces a highly marbled carcass with very tender beef. Consequentially the result is a high proportion of fattier table beef (such as steak) and less lean manufacturing beef (which is ideal for hamburgers). A percentage of the table beef is exported to Asia with the balance retained for domestic markets.

The US market remains a high volume importer of NZ manufacturing beef which is valued due to its relatively high percentage of protein to fat. The majority of bull beef is graded as 95% lean, with the poorer quality cuts of steer carcasses graded as 80% lean. This is then mixed with leaner cow and bull beef to make 'hamburger patties'. The US dominates the market for manufacturing beef due to a significant need for beef supply to meet extensive demands of the US fast-food industry.

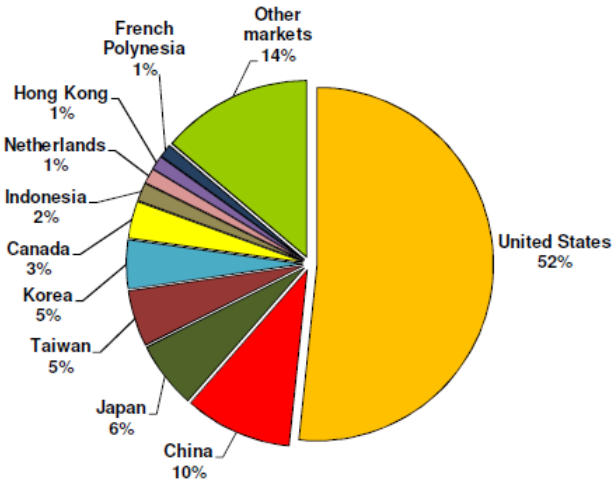
Due to being restricted by quota, NZ is somewhat limited in the volume of beef that can be sent to the US. "As a result of the GATT Uruguay Round 213,402 tonnes (product weight) of New Zealand beef and veal may be exported to the United States annually at a tariff rate of US4.4c/kg on most beef products. Imports within the Tariff Rate Quota ("TRQ") are referred to as in-quota. An out-of-

quota tariff rate of 26.4% ad valorem (based on the F.O.B. value) applies to product imported outside the quota (NZ Meat Board, 2015)." Despite the ongoing existence of the quota, NZ has never exceeded the limit due to the other markets which NZ processors supply.

Export Markets:

The following graph illustrates the top 10 markets that NZ beef is exported to across the industry:

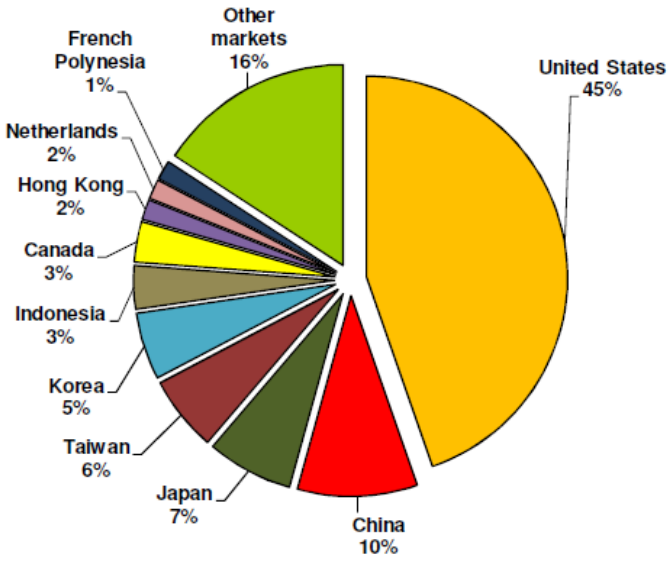
Figure 1: NZ Beef exports to 31st March 2015



Source: Meat Industry Association

As per the above graph (a), the US remains the major market receiving 52% of NZ beef exported over the past 12 months ending 31st March 2015.

Figure 2: NZ beef exports to 30th September 2014:



Source: Meat Industry Association

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The next graph (b) however shows that there has also been a significant increase in exports to the US over the past 6 months (the "Recent Price Fluctuations" section below attempts to explore the various factors impacting on this outcome). This recent increase demonstrates the impact that a change in price in the US market has on the NZ schedule price, simply as a result of the volume of product which is exported to this key market.

The challenge for NZ beef exporters is the continuing rise in middle class incomes in Asia and how best to capitalise on this increased income. As noted in the graphs above, the majority of countries in the top 10 export destinations are based in Asia. Beef consumption in China continues to grow rapidly with middle class incomes allowing Chinese consumers to increase the levels of protein they consume. The manufacturing beef market in China is also an area of continued growth which bodes well for NZ exporters. In discussion with Greenlea Premier Meats it has become apparent that although the US market remains important, there is a need to place a more targeted focus on Asia to drive increased returns

Greenlea report that primal cuts of their bull carcasses are exported to China and Taiwan (with up to 20% of these total carcasses being exported to China). 75% continues to be exported to the US with the balance sent to Taiwan, Malaysia and the EU. For Prime carcasses the figures differ significantly. 40% of prime production is exported to China, 25% to North America (USA & Canada), and 5% to

South Korea. A further 8% stays in NZ, with the remaining balance spread between the EU, Pacific Islands, the Middle East and other Asian countries. This diversification is incredibly important as it assists in ensuring that the organisation is not limited to price shocks in any one market.

4. Recent Price Fluctuations:

2014 and 2015 have seen the price of beef climb quite remarkably due to a continued shortage of manufacturing beef in the US. The prices for imported cow and bull beef have hit record highs, which when combined with a fall in the NZ dollar (NZD) has resulted in record returns for NZ farmers. Why?

The US beef market has been hit by a 'perfect storm'. As the US economy has started to 'wake from its economic slumber', the US consumer has become more confident and prolific in spending income as the dollar has strengthened. This change has been combined with the US domestic herd going through a major re-build after years of culling due to drought in the major cattle producing states. However, no sooner had price rises commenced before two major issues began to unfold, the strike on the West Coast ports and droughts in the cattle producing regions of Australia.

The Strike:

The strike on the West Coast ports was due to a major industrial dispute between port owners and striking labour unions, with the 5 yearly wage negotiations underway. Wharves from Los Angeles to Seattle were full of containers with ships waiting in the harbour for weeks to be unloaded. This resulted in the ports being unable to manage the container loads of meat being imported from Australia and NZ, and the exported product from the US to Asia.

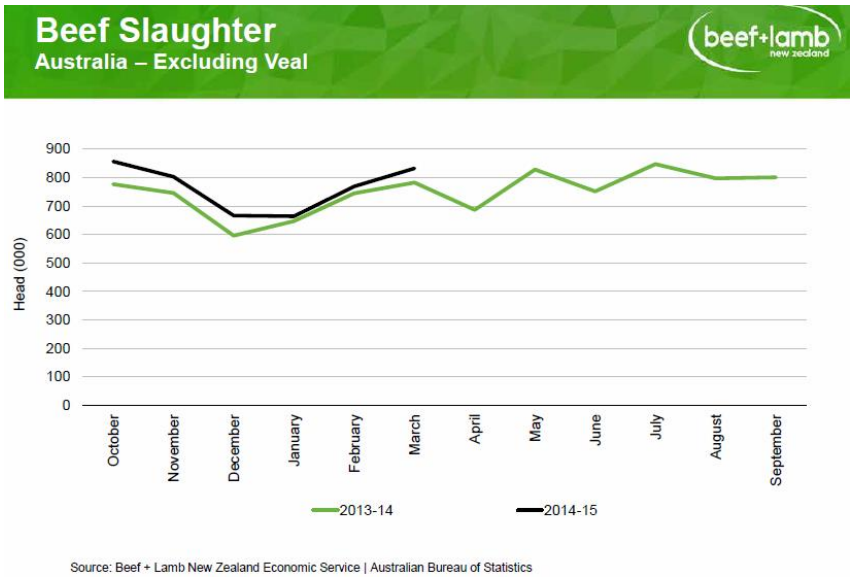
The overriding impact of this dispute was that US product due to be exported was returned to the US market for consumption putting pressure on 'imported' beef prices. US buyers pay a premium for US product because of its perceived quality and its higher degree of marbling in particular. A significant glut of product that had been shipped from NZ and Australia has also occurred, with meat sitting in chillers and warehouses within the US, and has resulted in buyers becoming more tentative with their purchasing. This has put significant pressure on the prices for imported cow and bull beef which directly impacts the prices NZ farmers receive.

Australian Cattle Production:

Another major impact on prices has been the ongoing drought suffered by the Northern cattle producing regions of Australia, especially North-West Queensland. The drought has been particularly severe and has seen a sharp decline in cattle numbers in the region due to graziers no longer having sufficient feed to graze animals. After 3 years of building herd sizes between 2011 and 2013, Australian farmers have been forced to slaughter record numbers of livestock over the past 18

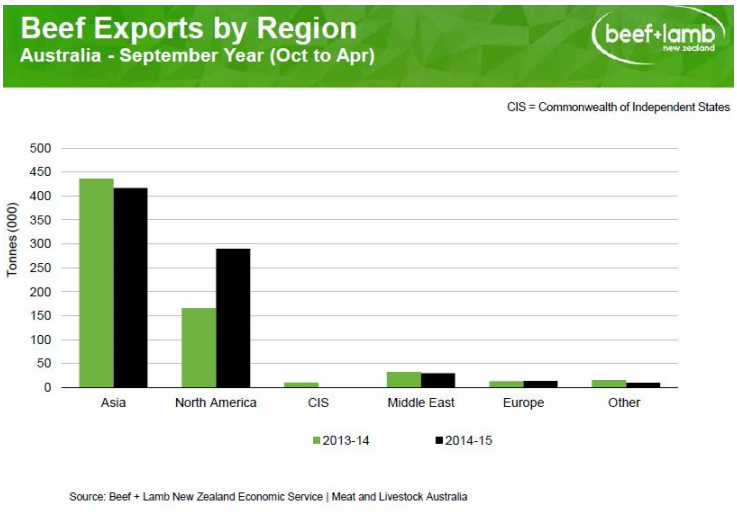
months as a result of these problematic climatic conditions. It is projected that the Australian cattle herd will reduce from a 35 year high to a two decade low in the space of 24 months (Meat & Livestock Australia, 2015). The Australian market has supplied approximately 9.17m head of cattle for processing in 2014, significantly above the 10 year average of 7.7m head/annum.

Figure 3: Australian processing figures to the end of March 2015



The impact of this supply has been to cap the increase in prices seen by NZ farmers. This is due to Australia turning its attention to supplying the US market after concentrating for a long period on exports to South-East Asia. Recent announcements from Australia have included the option of live exports to the US, which could then be fattened on US feed lots. This again would increase the supply of US beef leading to a reduction in the imported beef price and affecting farm gate returns in NZ, although there is a lot of regulatory paperwork to be worked through before this could become a reality.

Figure 4: A change of focus - Australia's exports over the past 6 months



Future Issues:

As noted above, China is becoming a more important market for NZ beef each year due to the rising middle class consumer and increasing incomes. However, the Chinese market is not without its own challenges. Brazil, the world's biggest exporter of beef has been 'locked out' of the Chinese market since 2012 due to a single case of Bovine Spongiform Encephalopathy (BSE) or 'Mad cow disease' which was found in a processing plant in Brazil. The recent announcement that Brazilian beef will be allowed back into the Chinese market has put increased pressure on prices and will ensure that exporters have to be very competitive with pricing.

5. Seasonal Price Variations:

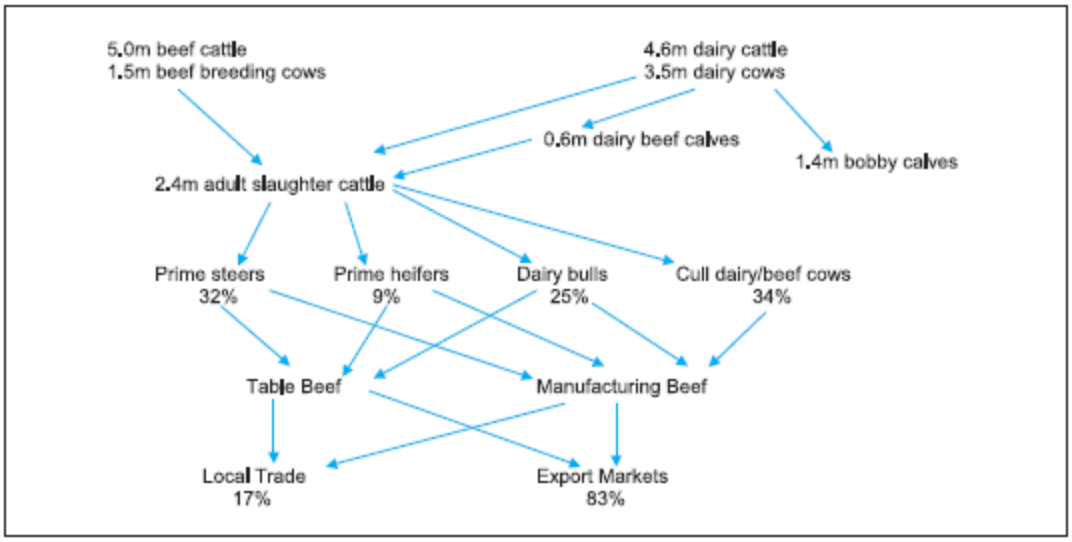
Throughout the course of the year, the schedule on which farmers are paid fluctuates in-line with market conditions and supply being offered to the processors. There are a number of major factors that influence the schedule price in NZ including the type of animal, exchange rate and global trends. These are detailed below.

Finally, there is also the 'natural' schedule price in NZ reflecting the timing of the NZ cattle processing season. This has a major impact on the price received by farmers, with an opportunity to increase the return received on-farm simply by changing the time of year in which cattle are sold. An understanding of the way in which the NZ processing season operates is important when trying to maximise returns from the industry.

Type of Animal:

As has been discussed throughout this report, there are different schedule prices for each type of animal due to the different uses of their carcasses. The following table shows the way in which different animals are used:

Figure 5: What our beef is used for.



Sourced from: Profitable Beef Production (2003)

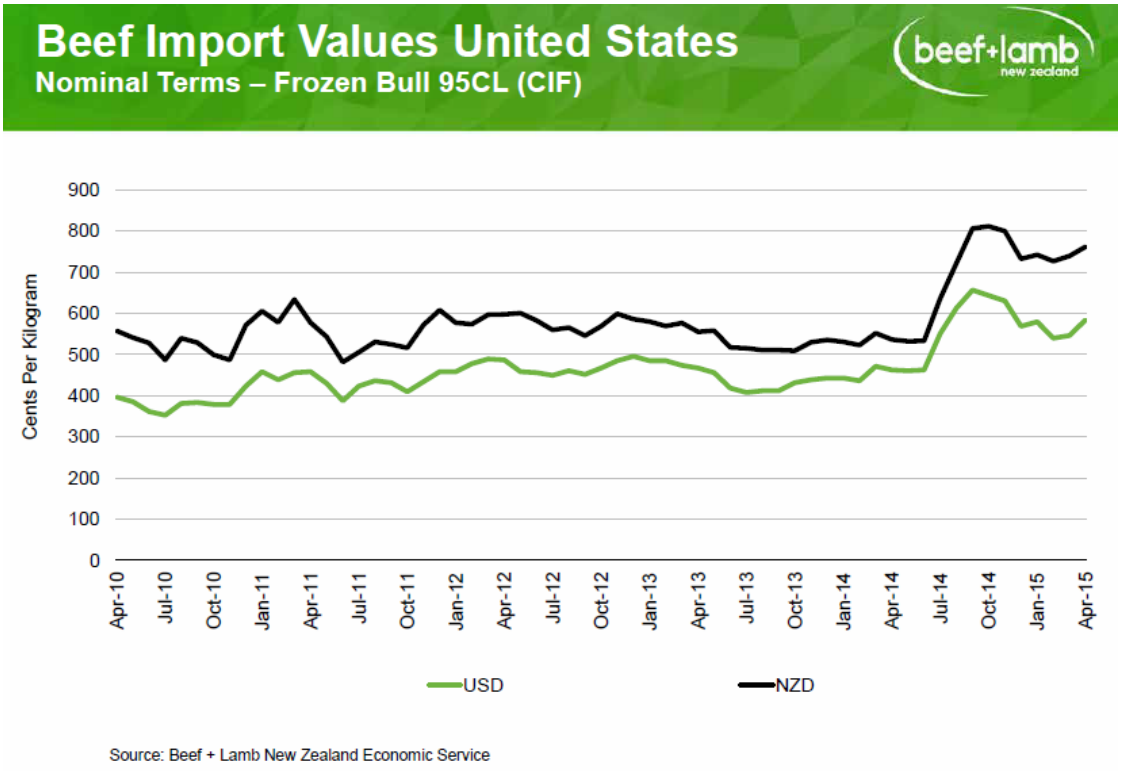
The schedule for different animals is set each week, with various processors paying slightly different amounts depending on the type of animal they want to kill over the following week. Typically the price offered will be for a 'M2 Bull', a 'P2 Steer or Heifer', or cow. The grade (M – Manufacturing, P

– Prime) and muscling grade (1, 2 or 3) are very important with deductions applied if animals do not meet the specified grade.

Exchange Rate:

The exchange rate is a significant contributor to the returns received by NZ farmers. In a similar vein to NZ dairy farmers, a 1c fall in the US/NZD exchange rate is worth an extra 10c/kg CW on the relevant schedule price. A 10c rise in the exchange rate could wipe as much as $1/kg CW off the schedule price illustrating how important it is that the US economy remains strong and the NZD stays low. The following graph illustrates the US Imported Bull Price in USD and then converted to NZ Dollars.

Figure 6: US Imported Bull Price



Source: Beef + Lamb New Zealand Economic Service

To illustrate the impact on the NZD price which processors receive, the exchange rate has been checked at two points on the graph. In March 2011, the exchange rate hit a low of 0.71906 USD / NZD with the NZD returns in the above graph showing a peak. Correspondingly, the exchange rate hit a high of 0.88089 in July 2014 with the graph showing a considerable "closure" in the returns in NZD. By October of 2014, the USD/NZD exchange rate had fallen to 0.78110, increasing returns to NZ processors by over $1/kg. This obviously has a significant impact on the NZ schedule offered to farmers.

Global Trends:

NZ's beef returns are greatly influenced by global economic and market conditions (particularly in the US). Issues likely to affect price prospects include the US beef industry, growth of trading partners, currency movements, market conditions determining supply (and thus trade by major competitors), constraints imposed by protective trade devices such as quotas and tariffs, and the progress of trade policy reform (Beeby, 2003). As reported earlier, the past year has seen an increase in prices for farmers led by an increase in the price for imported manufacturing beef in the US, which subsequently led to increased prices for prime beef as well. This can be adversely affected by other countries (particularly Australia due to the similarity of their offering) trading with the same parties as NZ or providing a competing product at a cheaper price.

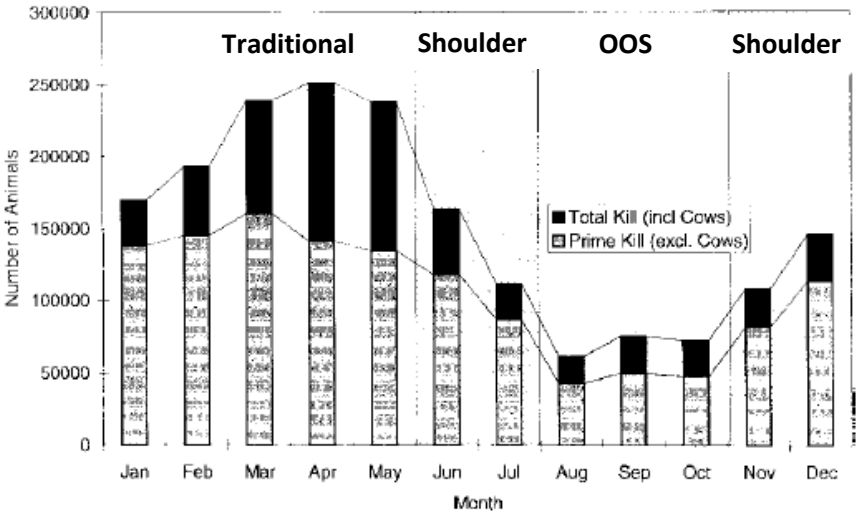
There will continue to be trade negotiations and barriers. For example, South Korea has had a tariff of 40% on NZ beef to protect their local industry. This is to be phased out over the next 15 years due to the FTA that has recently been signed between South Korea and NZ, giving NZ beef more of an opportunity in this market. A further example is that in the past 12 months Indonesia has reduced imports of NZ beef in an attempt to stimulate local prices, making it more attractive to local farmers and therefore making Indonesia more 'self-sufficient'.

It is important to recognise that every market is different. There are political influences in each market that will affect the ability of that market to accept or absorb increases in prices. There is a real need to adapt to fit each market. An attitude of 'one size fits all' will not be effective. Markets are also becoming much more discerning in their approach to animal welfare and feeding, as well as the use of antibiotics in the production process. As the consumer is asked to pay more, there is also a requirement to ensure that the same size, weight and assessment of meat quality are provided in each consignment.

The 'Natural' schedule:

In NZ, the schedule fluctuates through a cycle annually in-line with the seasonal availability of pasture and the increasingly important dairy cull-cow slaughter. As pasture production becomes constrained through the colder winter months, this reduces pasture available to 'finish' cattle and hence restricting growth rates. During this period, there is a natural reduction in the number of cattle available for slaughter, with the price rising during this period due to abattoirs looking to keep facilities running. The following graph demonstrates this information.

Figure 7: Graph showing Out of Season Supply (OOS), Traditional and Shoulder periods:

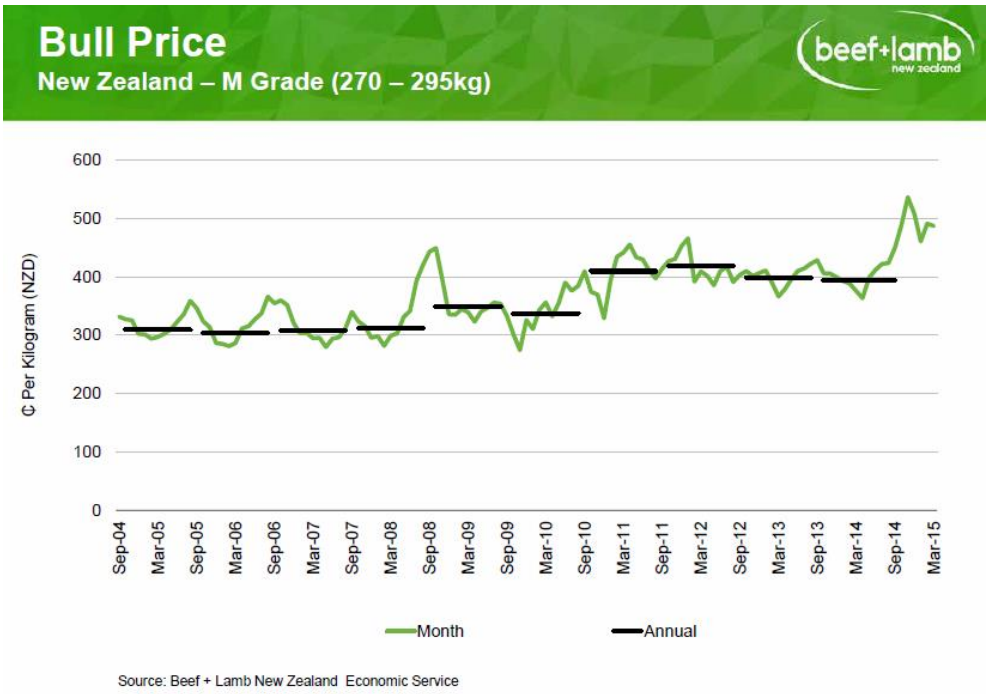


Sourced from: Sherlock, TJ & Parker, WJ, 1998.

The above graph (formed from data in 1994) shows quite clearly the period where NZ processors struggle to achieve meaningful supply due to pasture constraints. In a typical year, the spring period between October and December is characterised by high levels of pasture growth with farmers looking to maximise animal growth rates. Through this period, processors start to see numbers of cattle climb as farmers start to achieve target weights. The summer period between January and March is generally the highest processing period with cattle available for slaughter in their highest numbers, followed closely by the autumn period of April to June. Farmers have traditionally not wanted to carry stock through the winter due to low grass growth rates and a desire to minimise the number of stock on the farm at this time. This is also the end of the dairy 'season', with dairy herd numbers reduced prior to the influx of young heifers into the herd.

With these trends in mind, there is an opportunity for NZ farmers to take advantage of the natural increase in the NZ schedule through the months of July to October, regardless of the class of stock being farmed. When analysing historical schedule prices, it can be seen (in the Beef & Lamb Bull Price Graph on page 19 below) that this is when the schedule price is at its highest point.

Figure 8: NZ Bull Price over past 11 years



The above graph shows the bull schedule price, as compiled by Beef & Lamb NZ, over the past 10 years. It is important to note that the peak in the price occurs annually around September, in NZ's processing lull.

6. Farming Bulls:

"The New Zealand bull beef industry can trace its beginning back to the early 1970s and the high international beef prices current at that time. Industry pioneers, recognising the dairy farmer's 'bobby' calf as a resource too valuable to ignore, set out to determine how best to optimise this resource (Argyle, 2006)." The growth of the industry was directly linked to the North American market for boneless manufacturing beef, with the 95% lean bull beef produced in NZ being blended with fattier offcuts from prime steers and heifers for use in hamburgers.

After rapid growth in the number of bulls farmed through the 1970's, due in part to Government initiatives, numbers continued to grow steadily until the early 2000's. Since 2004/05 the number of bulls slaughtered annually has fallen, although the high beef prices received over the past 12 months have seen a trend towards more beef bred animals being left entire. It is a well-known fact that bulls grow faster than steers and have a much higher feed conversion efficiency ratio. However, there are behavioural issues that farmers must contend with when farming bulls. With a decline in the national beef herd (and hence a reduction in the number of traditional beef bred animals for finishing), there is an increasing focus on animals which can be retained from the dairy industry for finishing. "Cattle originating from the dairy herd currently contribute approximately 350,000 cull cows, 500,000 bulls and a small number of beef x dairy heifers to New Zealand beef production (Morris et al, 1992)." This poses the question, are bulls a good option?

Since the beginning of the industry there have been a number of changes in the way that bulls are farmed as farmers have adapted to the unique challenges presented by these animals. A number of different systems and strategies have been developed to ensure that bulls grow quickly and that a high degree of feed utilisation is achieved. These systems/strategies are discussed in further detail below.

Why Farm Bulls?

NZ farming is predominantly based on a pastoral farming system in which stock are mainly grazed on a grass based pasture, with the goal of turning grass into protein. The NZ beef industry relies on efficient utilisation of this feed to ensure that beef production is cost effective and hence profitable. It is widely accepted that bulls are the most efficient beef animals at achieving this utilisation.

Sourcing animals:

There are a wide range of animals now available for finishing farms to choose from. "In particular the number of animals (especially bulls) reared within the dairy industry for beef production has grown (McRae, 2003)." The traditional bull farming system has been to utilise surplus bull calves from the dairy industry. These are reared by professional calf rearers, dairy farmers utilising surplus colostrum milk, or bull farmers who are seeking to reduce their capital requirements by purchasing 4-day old calves for rearing. These are generally reared to 100kg live weight when they are weaned from milk onto pasture.

If these animals are not reared for the beef industry they are typically killed at 4 days old as 'bobby' calves, and represent a wasted opportunity. Farmers have traditionally sought Friesian bull calves (identified by having 4 white feet and a white mark on their forehead), with a number of crossbred animals (predominantly Jersey cross animals) left due to slower growth rates and lower potential live weights. With a change in the dominant breed in the dairy industry from Friesian to "Crossbred" (Jersey x Friesian animals), there may need to be an acceptance of slower growth rates to continue this source of bull calves.

In recent years there has been a trend towards keeping beef bred bull calves entire as well. A number of large farms have found that it is less work 'marking' calves with a proportion or all of the bull calves kept entire and reared as beef bred bulls. This has been more noticeable over the past 12 months with a number of station owners reporting in farming newspapers that the 'market' is requesting bull calves be left entire. The benefit of these animals is the tendency for them to finish earlier than Friesian animals which increases efficiencies and profitability. Traditional breeding cows such as Angus and Hereford are mated to 'terminal' sires such as Charolais and Simmental, with the progeny benefiting from heterosis or hybrid vigour.

Feed conversion efficiency:

The ability of an animal to convert feed to live weight gain (LWG) is generally referred to as its feed conversion ratio (FCR). The lower the FCR, the more efficient the animal is in converting feed to LWG. Common values for growing ruminants grazing pasture are around 7-10kg DM/kg LWG, while pigs and poultry can achieve levels of around 2kg DM/kg LWG.

When compared with other cattle such as heifers and steers, bulls have the most efficient FCR. Factors impacting on this efficiency are as follows:

- Bulls have a greater potential for LWG than either steers or heifers (estimated at 30% higher than heifers and 15% higher than steers).
- Bulls have a much higher protein to fat ratio than steers or heifers, with less energy required to grow lean beef than fat.
- Bulls are significantly more efficient at converting metabolisable energy (ME) into LWG.

Carcass Composition:

Bull carcasses are comprised of more lean meat than either steers or heifers, with most bull beef graded as 95 cl (95% lean). The meat is well suited to the manufacturing industry. Its dark red colouring with an absence of any fat allows for blending with fattier meat to produce the consistency of colour and appearance the consumer has come to expect.

Initially, bull beef exports were limited to boned beef which was boxed in a carton and sent to the US. Today, processors seek to maximise their returns by developing niche markets for some primal cuts, and seek to extract many more co-products from bulls. For example, Greenlea Premier Meats currently sends primal cuts from bulls to markets in Taiwan and China where their customers offer this meat as cheap steak cuts.

Carcass Grading:

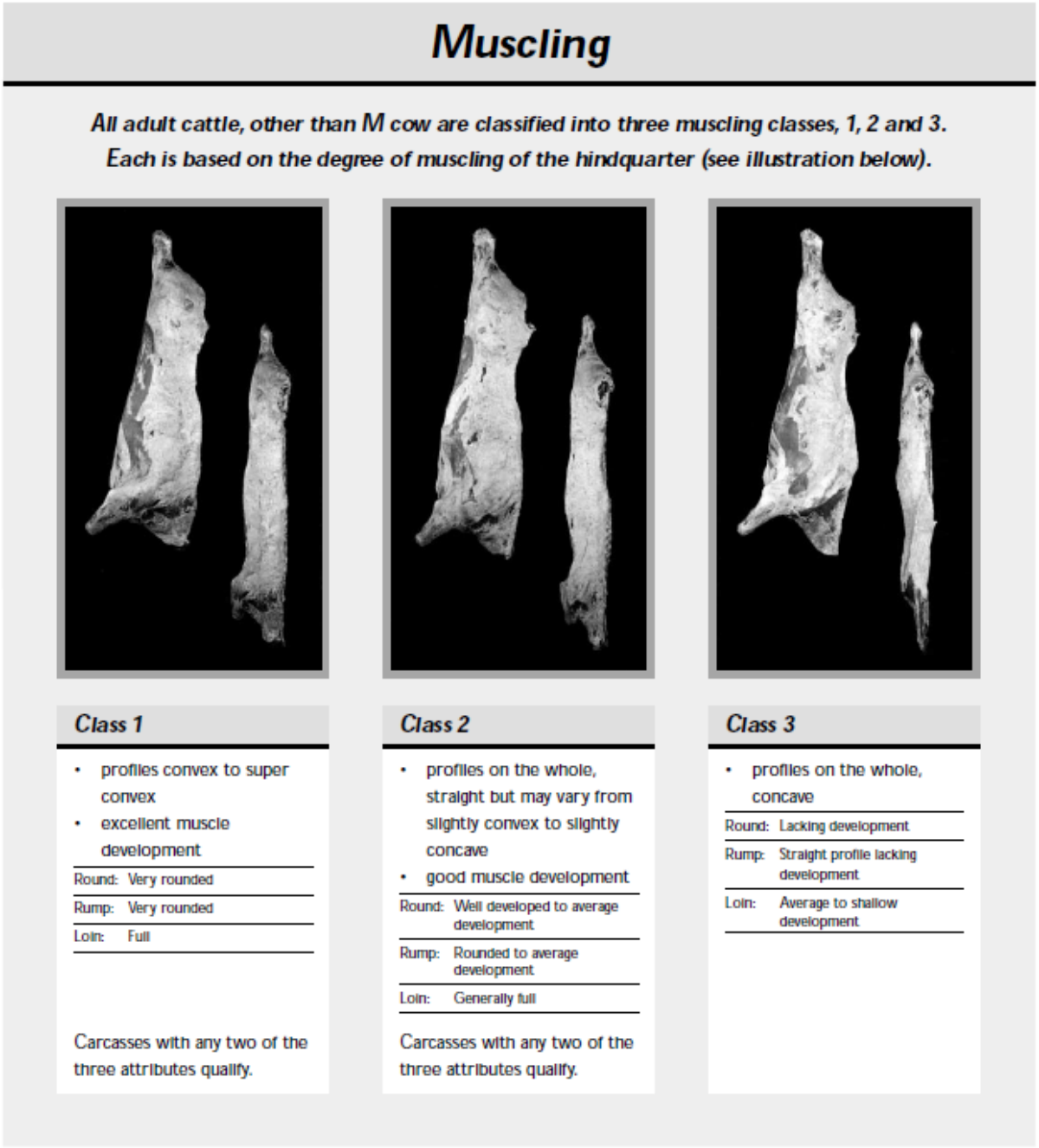
Bull beef is currently graded under a very simple grading system. Manufacturing bull carcass grading has two fat classes and 3 muscling classes as detailed below. Most processors will pay a premium for heavier weights within these classes.

Figure 9: Bull Classification Table

Bull			
Fat Cover Description	Fat Class	Fat Depth	Weight Ranges
Devlod to light, patchy	M	Under 3mm	Up to 195kg
			195.5-220kg
			220.5-245kg
			245.5-270kg
			270.5-295kg
			295.5-320kg
Light or medium to excessive	TM	3mm and over	320.5-345kg
			Over 345kg
Number of muscling classes: 3			

Sourced from: NZ Meat Classification Authority

Figure 10: Cattle Muscle Classification Table



Muscling

All adult cattle, other than M cow are classified into three muscling classes, 1, 2 and 3. Each is based on the degree of muscling of the hindquarter (see illustration below).

Class 1

- profiles convex to super convex
- excellent muscle development

Round:	Very rounded
Rump:	Very rounded
Loin:	Full

Carcasses with any two of the three attributes qualify.

Class 2

- profiles on the whole, straight but may vary from slightly convex to slightly concave
- good muscle development

Round:	Well developed to average development
Rump:	Rounded to average development
Loin:	Generally full

Carcasses with any two of the three attributes qualify.

Class 3

- profiles on the whole, concave

Round:	Lacking development
Rump:	Straight profile lacking development
Loin:	Average to shallow development

Sourced from: NZ Meat Classification Authority

The grading methods of bull carcasses means that they have the unique ability to be sold for slaughter at lower weights than other classes of stock with no financial penalty. Bulls can be killed at 180kg carcass weight (CW), with no need for farmers to worry about the level of fat covering which is important for prime stock. This allows bulls to be marketed in the event that feed conditions change on farm, with no negative financial implications.

Disadvantages:

Bulls can be a very difficult animal to farm. They can be a very 'anti-social' animal, fighting and riding each other in particular. Bulls also have a tendency to dig holes in the ground and are very hard on infrastructure such as gates and fences (due to rubbing and scratching), and are best run in small mobs (around 15-30 animals in a mob). They establish a very strong hierarchy within the mob, with any additions or changes to the mob leading to another period of fighting to re-establish the pecking order. This can lead to periods of low or even no LWG, and can result in having to separate animals into paddocks by themselves to prevent potential injuries.

Bulls are a very intensive animal to run effectively and efficiently. They are best farmed in an intensive system such as the "cell" farming system of daily shifts and with a lot of temporary electric (tape) fencing. Finally, they "are harder and potentially more dangerous to manage and require more stockmanship skills (Gleeson & Morris, NZ Beef Council 2003)."

7. Prime Beef:

"Without Prime Beef, NZ does not have a unique marketing story to sell to the world (Mike Goldfinch, Marketing Manager, Greenlea Premier Meats 2015)." Prime beef is the premium product which attracts consumers and is served as top quality steak in high-end restaurants.

Animals are generally sourced from the beef industry, although in recent years there has been an increase in the number of prime calves sourced through the dairy industry. Animals are reared to produce carcass weights of approximately 300kg for steers and 250kg for heifers to ensure premium sized cuts for the export market. The majority of prime steers and heifers are farmed on all grass systems, with farmers aiming to finish stock at 24 to 30 months of age, or during the spring 'flush' following their second winter.

Prime animals are generally much slower growing than bulls, with the important need to meet stock grading requirements to gain maximum payments. They are generally considered a much easier animal to farm as they do not have the same behavioural issues as bulls and can be shuffled between various mobs in line with the farmer's requirements with no negative effects.

Why farm Prime?

NZ beef farming began through the importation of small numbers of breeding cows which were then used to break in rougher country for the grazing of sheep flocks. Over time, the beef cow has been used to maintain areas of hill country while still producing a calf each year for finishing. While a proportion of the heifer calves are retained to form the herd replacements, the balance of the heifer calves and bull calves (of which the great proportion are castrated to become steers) are then finished as 'Prime' beef. The numbers of traditional prime animals are also supplemented with dairy cross bred animals (dairy cows which are mated to a terminal beef breed sire), with the great majority of these animals then reared and finished by beef farmers.

Sourcing animals:

Due to the wide range of animals available for prime beef production, there are a number of options available to finishing farms. The traditional source of animals for finishing are beef bred weaner cattle, which are born on hill country properties with beef breeding herds. The calves are reared to 6-8 months of age, before being weaned and sold, generally through sale yards. Up and down the country there are a number of weaner calf fairs each year where calves are sold to finishers. These

animals are generally of traditional beef breed, with farmers continuing to run Angus or Angus Cross beef herds predominantly.

Further animals are also available from the dairy industry. Dairy farmers traditionally 'tail-off' their dairy herd with beef breed bulls after the initial 6 weeks of AI (Artificial Insemination) where the herd is mated to traditional dairy breeds to ensure the next herd replacements. The beef breed bulls are run with the herd through to the end of mating, giving the farmer an opportunity to sell calves as potential beef calves rather than 'bobby' calves. These calves are generally reared to 100kg per the bull beef system before being sold to beef finishing farmers who will take the animals through to traditional prime finishing weights.

Farming Prime:

Due to the castrated nature of steers and the lack of testosterone in heifers finished in the prime system, the issues of sociability are largely negated when dealing with this class of animal. This means less stress on the farm itself, with the general incidences of behaviour problems, mishaps and damage to pastures and infrastructures lessened considerably. Cattle can be run in much larger mobs of 50 – 100 animals with the ability to move animals between mobs without the fighting associated with bulls. This means not only can steers and heifers be run in a more extensive manner (and in conjunction with other stock types such as sheep), but farmers can also change stock between mobs without animals losing weight.

Carcass Composition:

Steer and heifer carcasses are comprised of a fattier grade of meat with a large majority of their carcasses taken as 'Primal Cuts'. Approximately 54% of a steer or heifer carcass is utilised for 'table beef', with the balance of the carcass used for manufacturing beef. Prime beef when exported in the chilled form, fetches the highest price in New Zealand's export markets. It can also be exported as frozen cuts with a small amount exported as frozen quarter beef (i.e. the carcass is quartered) (Gleeson & Morris, 2003). The majority of NZ's prime production is exported, with a large proportion sent to the Asian markets. The greatest proportion of primal cuts comes from 'Prime' animals, with the cuts individually marketed to realise the highest value for the carcass.

Grading:

The grading system for Prime animals is much more detailed than for bull beef, and reflects the requirements to ensure 'table beef' remains highly palatable and tender. Cattle are graded based on

3 classes of muscling and 5 classes of fat cover ranging from 'Devoid' (classed as nil fat cover) through to 'Excessive' (classed as 17mm or greater of fat cover). Most processors accept "P" class (3-10mm of fat cover), with a deduction in prices paid for levels below this. Premiums are also generally paid for heavier weights due to the increased associated marketing opportunities created.

Figure11: Steer and Heifer Classification Table

Steer and Heifer			
Fat Cover Description	Fat Class	Fat Depth	Weight Ranges
Devlod	A	Nil	145-159.5kg
			160-195kg
			195.5-220kg
Light, patchy	L	Under 3mm	220.5-245kg
			245.5-270kg
			270.5-295kg
			Over 295kg
Light to medium	P	3-10mm	145-159.5kg
			160-195kg
			195.5-220kg
			220.5-245kg
			245.5-270kg
Heavy	T	11-16mm	270.5-295kg
			295.5-320kg
			320.5-345kg
			Over 345kg
Excessive	F	17mm and over	145-159.5kg
			160-270kg
			270.5-295kg
			Over 295kg
	Number of muscling classes: 3		

Sourced from: NZ Meat Classification Authority

Marketing Initiatives:

Over the past 10-15 years a number of programmes have commenced to take advantage of the different breeds typically farmed in New Zealand. These include Angus Pure and Hereford Prime, and are a good example of marketing initiatives which are utilised in an attempt to attract a premium to both the processor and the farmer. Typically these programmes have parameters around the heritage of the animal to provide an increased level of assurance to the customer regarding the quality and consistency of the product over multiple purchases.

These types of programmes have provided an incentive to farmers to farm particular animals, with a premium paid in excess of schedule prices of up to 30c/kg CW, a considerable premium. This

premium is only available to farmers of prime stock, not bull beef, and only through certain processors.

Disadvantages:

The major disadvantage of farming heifers and steers is their slower growth rate when compared with bulls, with a lower FCR. They also face more challenging grading requirements, hence running the risk of lower prices due to penalties associated with not achieving the correct grading parameters.

Steers in particular can also cost more than bulls when purchased on a cents per kg LW basis. There has historically been more demand for steers due to the flexibility of being able to run animals in more extensive grazing systems leading to more competition in sale yards and higher prices. However, given the schedule prices for bulls over the past 12 months, this may not always be the case.

8. Market Outlook:

The past 12 months has seen record returns to NZ beef producers, driven through a significant and sustained increase in the US manufacturing price. Current market predictions from both meat processors and Beef & Lamb indicate that this is likely to continue for a period as worldwide beef production moves through a shortage and herds around the world are rebuilt. Why?

The Cattle Cycle:

The cattle cycle refers to cyclical increases and decreases which occur in the cattle herd over time and arise from biological constraints preventing producers from instantly responding to price. In general, the cattle cycle is determined by the combined effects of cattle prices, the time needed to breed, birth, and raise cattle to market weight, and climatic conditions. If high prices are expected, producers slowly build up their herd sizes. However, if lower prices are expected, producers tend to reduce their herds. The cattle cycle averages 8-12 years in duration, the longest of all meat animals; however the effects of persistent dry conditions on pastures and harvested forage supplies can shorten or extend these cycles (Economic Research Service, USDA 2015).

Rebuilding stock levels:

US Market:

The US market saw a prolonged dry period between 1996 and 2003. This lead to a reduction in the number of heifers retained to re-build the national cow herd until 2003 and 2004. Farmers stopped liquidating their herds and started to retain heifers and calves due to an increase in prices for feeder cattle in the market. This improvement lasted until 2007 when a combination of increasing feed and energy costs lead to a decline in stock numbers. Since 2008, there was a slight re-building of numbers before a number of the major cattle producing areas including Texas, Tennessee and New Mexico were struck by crippling droughts. Since 2009, these states have seen a substantial drop in cattle numbers of 15%, 7% and 13% (Countrywide Beef, 2015). While other states have seen an increase in cattle, the overall impact has been a reduction in cattle numbers and particularly herd sizes across the US. This leads to a decrease in feeder cattle available for feedlot finishing, putting pressure on the US beef market and leading to increased prices. Whilst the limited availability of feeder cattle can be temporarily filled via imports from other beef producing nations, it is likely that US farmers will strive to re-build herd sizes to take advantage of the increased prices. Although cattle numbers in the US are coming off a 63 year low of 89.8m head including beef and dairy cows, all indications are that the national herd cull has reduced (within the last year) as southern states receive increased rainfall and pastures freshen (Countrywide Beef, 2015). There is also an

expectation that cheaper feed will become more readily available due to the volume of snowfall in the winter and correspondingly high moisture levels for spring sown crops. This will lower the cost of production of animals on feedlots, allowing the US to produce beef cheaply and provide farmers with further incentive to increase production.

Australia:

As reported earlier, Australia is experiencing the negative impact of an extended period of crippling droughts in its Northern cattle producing regions. This has resulted in a number of major stations destocking properties entirely, with the Australian beef herd expected to hit a two decade low of 26.8m head in June this year. There is an expectation that the adult cattle slaughter in 2015 will total 7.8m head, a reduction of 15% on 2014. Despite these figures, actual beef production is expected to be maintained at relatively stable annual volumes of 2.19m tonnes (t) of carcass weight. This is expected to cause a decline in beef exports of approximately 19%, with exports expected to total 1.05m t (from 1.29m t in 2014) (MLA, 2015).

The Opportunities:

USA:

As indicated in the "rebuilding stock levels" section above, there is likely to be a net shortage of beef in the US market which will need to be addressed via imports from other nations. The major 3 exporters to this market are Australia, Canada and NZ. With Australia likely to reduce its cattle exports over the next 12 months, the market may be left with less beef than traditionally imported from this source. NZ has not yet reached the quota set by the US, although this may occur over the next 12 months should prices reach levels previously seen in late 2014.

Prices for imported cow and bull beef reached record highs of US$2.97/lb and US$3.17/lb respectively in November 2014 due to high levels of consumer confidence and the shortage of locally produced beef (Countrywide Beef, May 2015). Levels then decreased to US$1.95/lb and US$2.20/lb respectively due to work strikes which occurred on the wharves. These strikes were accompanied by huge volumes of Australian and NZ product filling cold stores prior to the traditional US period of peak demand over the summer 'barbeque' months. As this surplus works its way through the system, there is expected to be an increase of approximately US40c/lb in these prices due to a marked gap between domestic and imported beef prices and short supply as the NZ and Australian cattle slaughter season reaches its end.

The risk in this market is the potential for the US to relax quotas on either EU (currently limited to 30,000t) or Brazilian (currently limited to 66,000t) imports. The US and EU remain locked in trade talks which are due to be completed by 2016, however given there are wider issues at play (wider trade barriers due to competing US & EU interests), this risk is unlikely to be an issue in the short term. Brazil on the other hand is the largest beef exporter in the world and could quite comfortably fill a higher quota. Given their proximity to the US market they could also easily send beef at a cheaper price than NZ, potentially reducing returns for NZ farmers.

The outlook for this market is incredibly strong for the next 12-18 months. With the high proportion of NZ beef exported to this market, this will allow a certain 'base' level in the NZ schedule for prime and bull prices.

China:

There has been a significant rise in Chinese demand for beef over the past 5 years, with NZ's exports to this market rising from approximately 3,000t in 2010 to in excess of 42,000t in 2014. China's beef imports surged six fold to 300,000t in 2013, before easing back to 250,000t in 2014 (Countrywide Beef, May 2015). The Chinese market has had its confidence rocked by a number of food safety scandals over the past few years, however with the majority of NZ processing plants now certified there are likely to be some great opportunities as this market continues to grow.

On discussion with Greenlea Premier Meats, they advised that there are some excellent opportunities for both primal cuts and manufacturing beef as the incomes of Chinese consumers rise. NZ is in a fantastic position via a great marketing story and the benefit of the Free Trade Agreement (FTA) leading to nil tariffs next year.

Japan:

Japan has typically been NZ's 3rd largest export market and is an incredibly important market due to the high value of cuts purchased. However, the amount of product exported to Japan over the last 5 years has declined due to competition from other exporters and trading agreements established with other exporting nations. In 2014 Australia signed a trade deal with Japan, reducing tariffs on Australian beef from 38.5% to 19.5% over a period of the next 18 years. This will result in Australian product being considerably cheaper in comparison with NZ product, potentially negatively impacting on NZ exports to Japan. A conclusion to the Trans Pacific Partnership Free Trade (TPP) round of

trade negotiations may change this however, and could in fact lead to an increase in exports to Japan.

EU:

Although the EU is a major market for NZ lamb, it receives very little NZ beef at all. In 2014 NZ exported approximately 10,000t of beef to the EU, home of approximately 500m people. There are incredibly high tariffs in place with only 1,300t of NZ beef subject to the lowest tariff of 20%. Further exports are very highly taxed and compete against other major exporters including Australia, Canada and the US. There is a significant amount of work currently being undertaken by NZ negotiators to try and advance a NZ/EU FTA which would see the potential value of this market being unlocked. There are a number of particularly wealthy consumers in the EU who NZ processors would like to focus their marketing upon, particularly given the desirable NZ marketing story (pasture produced, hormone free beef).

The Threat:

Brazil:

Brazil is the world's largest exporter of beef and maintains one of the largest beef herds (in excess of 210m head of cattle). Traditionally this has been a domestically lead market, although in 2014 they exported approximately 1.3m t of beef to 92 countries, equating to about 20% of total production. With a large amount of cheap feed on hand due to record production of corn and soybeans, Brazil appears to be changing its focus more towards exporting opportunities. China has recently allowed the importation of Brazilian beef after a hiatus of 3 years due to BSE being found in 2012. This could severely impact on NZ beef exports to China.

The other challenge on the horizon is the opening of US borders to Brazilian beef. Currently Brazil has a relatively small quota limit of 66,000t to the US market, with the balance of Brazilian beef exported to the US as processed product. If this quota were to rise it could put significant pressure on the price achieved by NZ beef.

9. Other Opportunities

Marketing:

There is an increasing opportunity particularly in the US market for beef which is fed 'naturally' on a pasture based system, with no antibiotics. A feature of the US feedlot system is that stock are fed on a grain and soy based diet, with a number of additives including antibiotics and hormones added to reduce infections, promote increased feed efficiency, increase growth rates, and to reduce manure production. Although this system produces a prime animal in an incredibly fast and effective manner, there are increasing concerns from consumers that this is not natural and may lead to increased resistance to antibiotics. There are also increasing concerns about the environmental impact of these operations. These issues include the cropping operations which provide the supplement for use on the feedlot using substantial amounts of water and nitrogen in particular. This has an impact in terms of environmental degradation of soil structures and nitrification of ground water supplies, which then cannot be used for human or animal consumption. Cattle are subjected to the unnatural environment of vast areas of concrete with thousands of other animals in close proximity, with a detrimental environmental impact from the effluent of having so many animals contained in a small area.

The majority of NZ's beef is produced in an environmentally sustainable manner. Cattle are farmed on pasture or crops, with little or no antibiotics used in a normal farming operation. High end consumers in the US are becoming more and more interested in this type of product, both from a grinding and table beef perspective. This is providing incentives for farmers to keep accurate records, with at least one processor offering a premium above schedule for animals produced in this manner.

On-farm:

Following discussions with a number of processors, it became apparent that the question "Prime or Bull, which animal will 'make more' for farming operations?" should have in fact been "which type of animal 'works best' for farmers/farms?" The decisions that are made on-farm are extremely important and reflect the animal which works 'best' for each individual farming operation. There may be a place for either bulls or prime steers and heifers (or a combination of both) in a farming operation, and once the type of animal is decided upon, farmers may then be required to set aside potential returns as a result of the ongoing commodity driven market. However, there are still opportunities to improve our returns. Some of these opportunities have been outlined below:

Cropping:

There are a wide variety of crops available with some excellent research being completed as to the best options for individual operations. These include the more traditional cereal crops as well as newer finishing options such as fodder beet which has been referred to as the crop that could 'change the beef industry'. In the US market cattle are fed on feedlots and are finished in 14-16 months. There is the potential to achieve similar on-farm and paddock results utilising a crop such as fodder beet, with some people already achieving these results via this method. Some processors are now recognising that animals finished in these shorter timeframes present with very tender meat, and a premium is paid for these animals. These premiums, along with the increased return on capital from holding stock for shorter periods, could well deliver increased returns to farmers.

Cross-breeding:

The cross-breeding of breeding cows in the beef industry to produce fast finishing bulls has been discussed in the "Bull Beef – Sourcing Animals" section of this report. The downside of utilising this approach in the prime industry is that despite the benefits of cross breeding, processors have invested considerable sums in marketing specific breeds such as Angus and Hereford, rather than cross bred animals. On the other hand, there is a significant research available demonstrating that animals which are cross-bred benefit from heterosis leading to faster development, and finishing of animals within shorter timeframes. This means that returns are potentially improved by having the animal on the farm for a shorter period of time.

Red Meat Profit Partnership:

The Red Meat Profit Partnership is a major piece of work being undertaken by a number of different parties who are aligned to the NZ Beef and Lamb sector, in partnership with the NZ Government. The project has been sponsored by 9 industry partners (Alliance Group, ANZCO Foods, ANZ Bank, Beef & Lamb NZ on behalf of farmers, Blue Sky Meats, Greenlea Premier Meats, Progressive Meats, Rabobank and Silver Fern Farms) who are co-funding the project with the balance of the funding coming from the Ministry for Primary Industries on behalf of the NZ Government. There is a considerable amount of work being put together by the partnership to understand how farmers can best utilise the information being provided, leading to more informed farmers and potentially more profitable farms.

The process of learning and understanding how best to run these multi-faceted and very complex businesses is ongoing. There are substantial productivity gains that can be made on-farm, with

better systems in place to achieve higher growth rates and faster finishing, whilst also achieving improved environmental outcomes. The opportunity to market NZ beef to the world in a more cohesive and targeted manner can still be achieved, but also requires a focus on what farmers can change inside the farm-gate.

10. Summary:

The New Zealand beef industry has evolved and adapted from humble beginnings following the landing of a small beef herd in the Bay of Islands in 1814. From their initial use as a tool to improve pastures for the sheep industry, the beef industry has developed to a point where it is now a major contributor of export income to NZ. Whilst the number of cattle farmed has gradually decreased due to competing land uses, the quality of cattle produced today is the highest that it has ever been.

Innovative pioneers changed the face of the beef industry in the 1970's, with the addition of 'dairy beef' or bulls born in the dairy industry and finished by beef farmers. Today the farming of bulls is a major contributor of beef to the export markets, although prime steer and heifers still contribute to the majority of stock processed.

There are various rationales as to why farmers choose to farm either bulls or prime steers and heifers (or a combination of both). The challenge of working with bulls due to their temperament and natural instincts to test man and infrastructure can be offset by their ability to convert grass to protein at a rate which is hard to achieve in prime cattle. Prime cattle on the other hand generally demonstrate a 'calmer' temperament, can be easily shifted between mobs with no adverse effects, and can attract a significant premium when compared to bulls (especially if they are identified as a specific breed marketed to consumers). Although prime animals are generally thought of as producing 'steak cuts', they are in fact also sold to the manufacturing market with 46% of a prime beast used for manufacturing or grinding beef.

To maximise value from the beef industry, farmers are heavily reliant on the processors and exporters marketing NZ products in export markets. With a traditional focus on the US, South Korean and Japanese markets, there has been a focus on new and emerging markets such as China, and a traditional yet under serviced market such as the EU. In both markets there is a significant opportunity to focus on high value, high net worth consumers who can afford to pay top dollar for NZ beef. However NZ must protect its position in traditional markets such as the US, where approximately 50% of beef production is sent, or risk losing a market for a substantial proportion of its total production.

Although, as outlined above, there are a range of pricing and exporting factors which are outside of the control of NZ farmers, farmers themselves can impact positively on returns by choosing to farm animals that are the 'best fit' for their farming operation and goals. Once the decision is made as to

the animal which best suits their farming operation, be that prime or bull (or a combination of both), the focus then needs to be placed on farming and finishing these animals efficiently and in line with desired/targeted parameters. By ensuring that stock are well looked after from an animal welfare perspective, and with clever advertising of NZ's 'grass fed' market, we can ensure that NZ beef is a sought after product in both the manufacturing and table beef markets. Costco (one of the largest wholesale market operations in the US which is open to retail consumers) is purchasing approximately 35% of their manufacturing beef from NZ due to a desire to offer more premium grass fed beef to their consumers. This is the type of opportunity NZ is looking for.

NZ farmers produce a high quality animal for processing, whether that is Prime or Bull beef. Unfortunately due to the current nature of market forces, farmers do not always receive returns that reflect the quality of product provided. NZ continues to primarily export a commodity product, and until such time as the NZ beef industry is successful in differentiating our product from others in the market, this will continue to be the case.

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