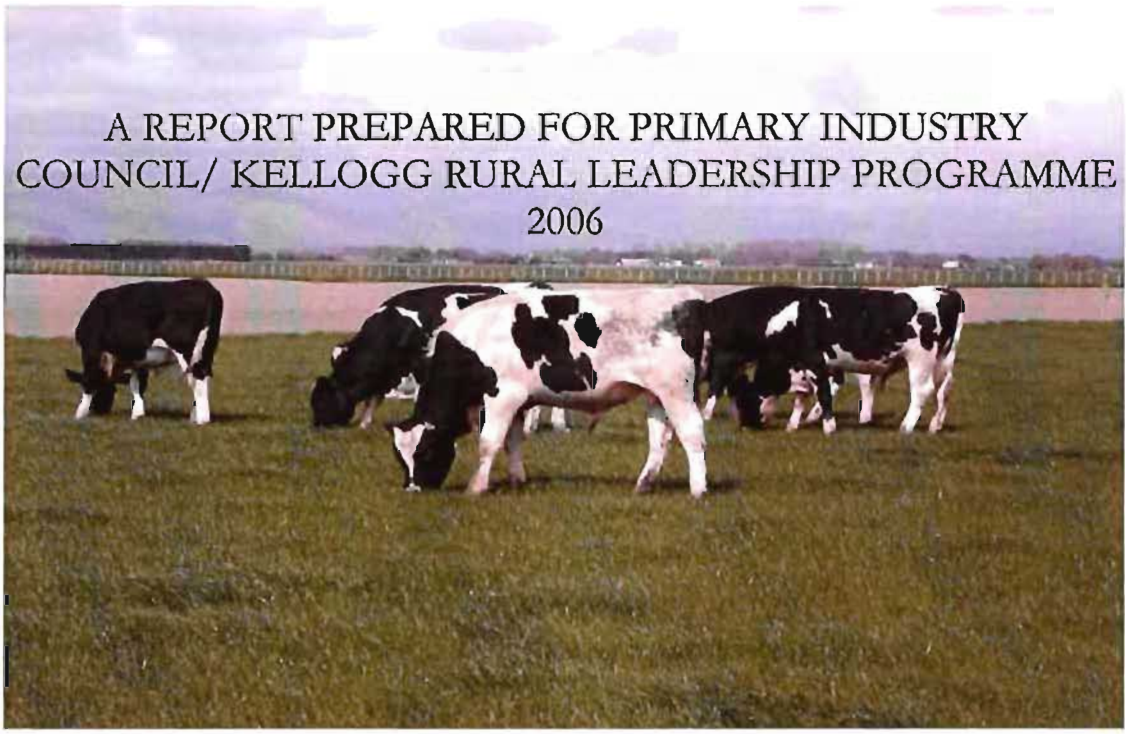
'A LOAD OF BULL'

An overview of the New Zealand Bull Beef Industry



Researched and Written by Paul Argyle

Executive Summary

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, recognizing the dairy farmers 'bobby' calf as a resource too valuable to ignore, set out to determine how best to optimize this resource. Through research, trial and error and the school of hard knocks the pool of information and experience expanded over those early years.

Significant productivity gains were captured and the number of dairy-bred bulls being farmed continued to increase. Acknowledging the high growth potential of bulls, farmers continued to fine tune production systems and management practices. The fact that no one 'best' production system has evolved is testament to the many and varied factors at play. This report explores these factors and some key principles to be observed in designing an efficient bull farming system. It also investigates changes in how bulls are processed and marketed today compared with those early years. Looking to the future the report seeks to identify issues to be faced and opportunities to be grasped while identifying strengths and any apparent weakness.

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List of abbreviations

BSE	Bovine Spongiform Encephalopathy (mad cow disease)
CWT	Carcass Weight
CW	Carcass Weight
DM	Dry Matter
FCR	Feed Conversion Ratio
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
hd	Head
ha	Hectare
Kg	Kilogram
LWT	Liveweight
LWG	Liveweight gain
ME	Metabolizable Energy
MJME	Megajoules of Metabolizeable Energy
OOS	Out of Season
SYB	Selected Young Beef

Chapter 1 - Introduction

The New Zealand dairy bull beef industry produces manufacturing grade beef for world markets. Male calves are retained from the dairy industry and via various grass based production systems are grown to slaughter producing lean beef and co-products which are marketed to the world. Identified export market opportunities, especially in the North American market, and the realization that the NZ dairy industry 'bobby' calf was a resource that was not being used to its potential, initiated the development of the NZ bull beef industry.

This report explores how this resource is utilized and value is added capturing significant export returns. It looks at issues faced when farming bulls and systems that have developed to increase both the practicality and profitability of the exercise.

It will provide an insight into the growth and evolution of the industry while investigating opportunities and threats of the future. It will also seek to identify trends and make evaluation as to the efficiency and productivity of the industry.

In researching this topic I sought input from many industry participants from farmers through the chain to meat company operators and those involved in marketing. I carried out a literature review to ascertain what information had been presented previously and have referenced some of this in the report. I called on my own experience and knowledge built up over 30 years of farming bulls. My objective in writing this report is to inform and maintain a readers interest so I have sought not to become overly technical by presenting more data than I believe is necessary to support an observation or finding. The plethora of information available indicates any investigation could always go to a deeper more wide ranging level, however time availability and my stated desire to present a report easily readable precludes this.

I would like to acknowledge all those people who have assisted me with this report. I appreciate the time people have given me and the information and ideas they have happily shared. To my family I say a big thank you for all your support and encouragement. And to my good friend Leonie, your guidance and encouragement has been invaluable. Each one of you have helped made the task achievable and enjoyable. Thank you.

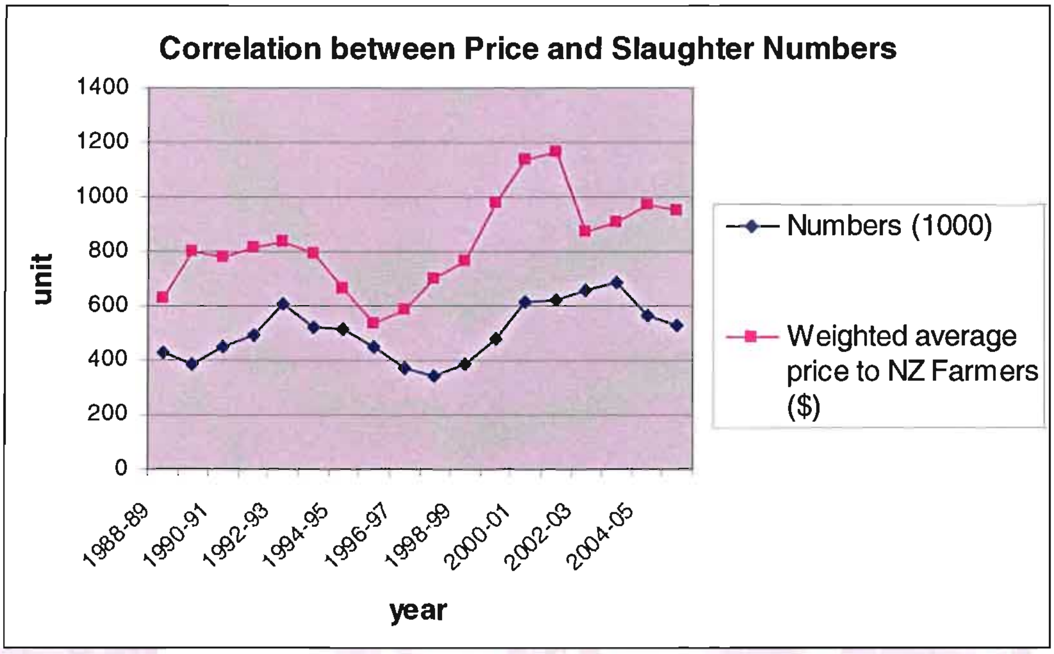
Chapter 2 - Overview of the Bull Beef Industry

Most beef produced in New Zealand comes from one of two sources. There is the traditional beef cow based production and secondly the beef produced utilizing surplus calves from the dairy industry. "A feature of the New Zealand beef industry is that the dairy herd contributes 60% of the annual cattle slaughter comprising approximately 350,000 cull cows and 700,000 bulls" (Morris, Navajas and Burnham, 2001).

The New Zealand Bull Beef industry gained impetus in the 1970 when farmers began rearing dairy-bred bull calves responding to high beef prices and strong demand from the North American market for boneless manufacturing beef. Implementation of "The Dairy Beef Market Guarantee Scheme" in 1976 further encouraged bobby calf retentions. The government scheme provided a small payment for each calf retained from the National Dairy Herd for beef production. Rapid growth of the 1970's has been replaced by fluctuating numbers with a gradual upward trend in numbers being farmed. However 2004/05 saw a significant drop in bull slaughter numbers.

Calf retentions and therefore bull slaughter numbers have always had a close correlation to the world market prices especially the high value North American market. This correlation can be clearly seen from graph 1. The ready supply of calves means production can be geared up quickly in response to higher profitability, the converse is also true that if market opportunity does not look attractive farmers can choose another option.

Graph 1: Correlation between Price and Slaughter Numbers



Source: Meat and Wool Economic service

Calves are reared by; professional rearers who 'on sell' 100kg weaners to finishers, by dairy farmers rearing some calves to utilize surplus colostrum and provide cashflow, or by finishers seeking to reduce their capital outlay by taking calves from 4 days old, through to slaughter. If these calves are not reared for beef, they are slaughtered at 4 days old as 'bobby' calves representing a significant lost opportunity.

Growth in the dairy industry has seen the national herd increase by approximately 1,000,000 cows over the past 10 years (Meat and Wool NZ Economic Service Stats, 2006). Over the same period, bobby calf slaughter numbers have increased significantly to a high of 1,600,000 in 2002-03 with bull slaughter numbers at 656,000 head (Meat and Wool NZ Economic Service Stats, 2006).

This would suggest a supply of calves is not an impediment to higher bobby calf retentions for the beef industry. Many of these surplus calves are left entire and farmed as bulls.

Historically, well marked friesian calves are preferred by bull finishers because of their high growth rate potential and have become the benchmark for the industry. An increase in cross breeding within the dairy industry has led to a higher percentage of bobby calves unsuitable for beef production. However, trials examining the comparative performance of friesian and selected jersey-friesian cross bulls determined that the purchase price discount of the later is greater than the difference in performance (Muire, Fugle, Smith and Ormond, 2001). This suggests that many bull calves deemed unsuitable for rearing should not be dismissed especially in the event of calf availability becoming a barrier to growth in the bull beef industry.

Chapter 3 - Why Bulls ?

The cost of supplying feed is a major expense in beef production systems and as such the efficient utilization of this feed is fundamental in the development of a profitable production system.

There is general acceptance that bulls have several characteristics that offer real benefits to beef producers in New Zealand.

3.1 Feed Conversion Efficiency

Feed conversion ratio (FCR) is a measure of the amount of feed eaten per unit of bodyweight gain, FCR should be minimized. Common values for growing ruminants grazing pasture are around 7-10 whereas pigs and poultry aim for values less than 2. (Morris, 2003).

There are three ways in which bulls minimize the FCR.

1. Bulls have a greater potential for live weight gain (LWG) than castrates or females.
2. The LWG of bulls contain more protein and less fat than steers or heifers. The cost of depositing lean beef is much less than that of fat consequently lowering the FCR.
3. Bulls are 15-20% more efficient at converting metobilizable energy (ME) into LWG. For example, for bulls and steers of the same live weight (LWT) with an intake of 60MJME or 5kg DM bulls will grow at 0.8kg/Lwt per day and steers at 0.6kg/Lwt per day (Morris, 2003).

3.2 Carcass Composition

Bull carcasses produce more lean meat than steers or heifers. Their meat is well suited for the manufacturing market as its dark colour together with its absence of fat means it can be blended with fatty trimmings and the like to produce a product that appears not to be overly fatty. Its higher ph and water holding properties also offer greater binding capabilities in processing. (McCrae & Morris 1984)

In the early days of the industry most of the meat was simply frozen in a carton and sent to North America. Today processors optimize returns by developing niche markets for some primal cuts and extract many more co-products from bulls. The new voluntary selected young beef (SYB) grade is aimed at promoting bull beef to a wider market by emphasizing its unique properties.

3.3 Grading Requirements

Bulls also have the advantage of having to meet a relatively simple grading system. Manufacturing bull carcass grading has only two fat and three muscling classes. The figures below document the carcass specifications that bulls are graded to.

Mandatory Carcass Category

Bull

Fat Cover Description	Fat Class	Fat Depth	Weight Ranges
Devoid 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 345.5kg
	Number of muscling classes: 3		

Voluntary Carcass Category

Young Lean Beef (XY)

Young bovine carcasses with not more than 2 permanent incisors erupted

Qualifying Fat Classes	Fat Depth	Weight Ranges
A	Nil	Refer Qualifying Classes
L	Under 3mm	
P	3-10mm	
M	Under 3mm	
TM	3mm and over	
Number of muscling classes: 3		

- Hot weight – the basis on which New Zealand producers are paid. This measurement is used only within New Zealand.
- Fat thickness – the depth of subcutaneous fat over the fourth quarter of the eye muscle at the 12th rib. In practice company graders and auditors use it as a guide while also considering the fat content of the whole carcass.
- Cow – includes steer and heifer which are either: i) under 145kg; or: ii) excessively yellow; – includes cow which are either i) under 160kg; or: ii) excessively yellow.
- L Type – cow carcasses are classified as M cow.
- A class is intended to encompass those well muscled steer and heifer carcasses over 145kgs which are devoid of fat.

Young Lean Beef

Young lean beef is a voluntary carcass category. Carcasses which can be included are A, L, P, M and TM fat classes. Where the class is packed, the present mandatory criteria apply. Carcasses saved for this class must carry the cypher XY on the grade ticket.

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 illustrations 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

As can be seen from table 1, there is little financial differentiation between grades[1].

A feature of note is the graduated schedule; the heavier a bull's carcass weight the higher the return per kilo. This reflects the increased yield of heavier carcasses and is added incentive for farmers to lift CWT. Simply demonstrated, if a 270kg CWT bull returns $907 on schedule, a bull only one kilo heavier at 271kg CWT would be in a higher weight range and return $924 to the farmer.

Table 1: Indicative Bull Beef Schedule as at week beginning 13 November 2006

Grade	**Weight Range (kg CWT)**	**North Island Price (c/kg)**
M2 Bull	221-245	326
M2 Bull	246-270	336
M2 Bull	271-295	341
M2 Bull	296-320	345
M2 Bull	321-345	350
M2 Bull	345+	355
TM2 Bull Discount		-5
Bull M1 Premium		5
Bull M3 Discount		-5

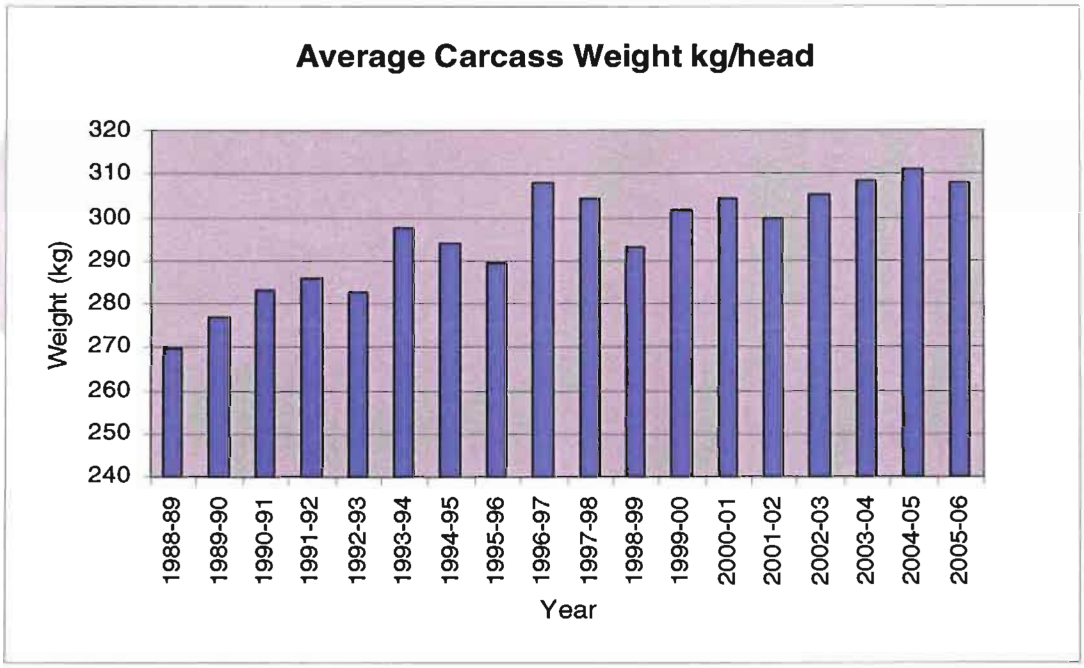
Source: Agrifax

[1] From my own experience, slaughtering approximately 500 friesian bulls each year over 95% would grade M2

Chapter 4 - Industry Statistics

Graph 2 Shows how the average carcass weight of bulls slaughtered have maintained an upward trend over the last 15 years as farmers have sought to raise animal performance.

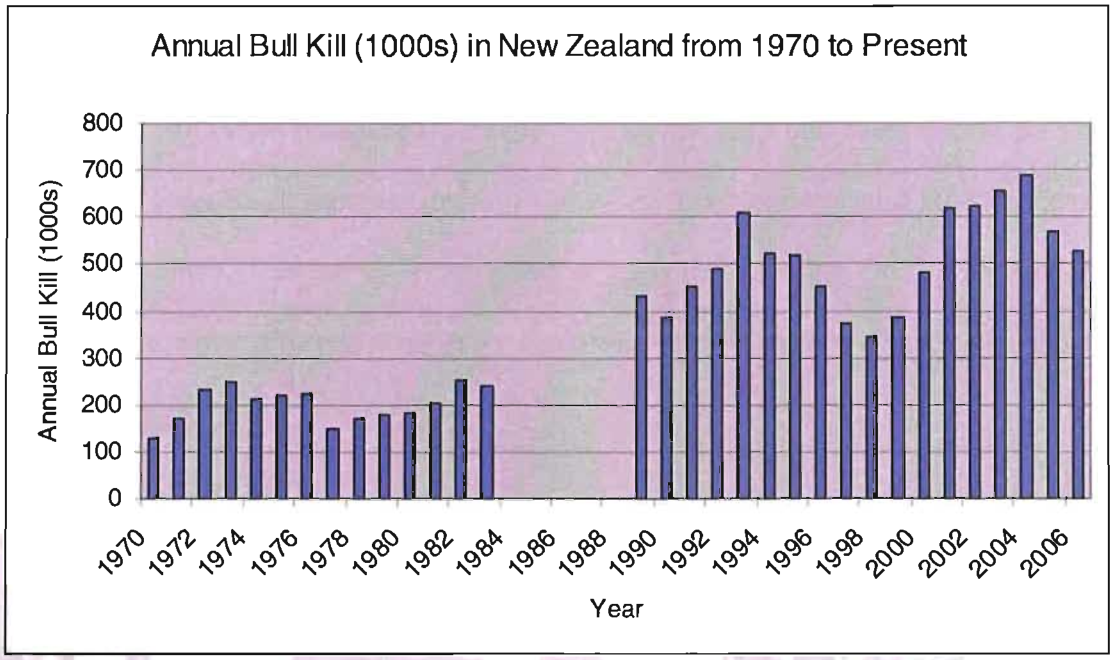
Graph 2: Average Carcass weight of Bulls slaughtered annually



Source: Meat and Wool Economic Service

Graph 3 displays the increasing numbers of bulls killed through the 1970s-1980s and the cyclical nature of the total annual bull kill as the number of bull calves retained from the dairy industry respond to changes in the beef price and associated profitability.

Graph 3: Annual New Zealand Bull Kill



Source: Meat and Wool Economic Service
McRae and Morris, 1984.

Chapter 5 - Production Systems

That many and varied production (farming) systems for dairy bull beef have evolved over the past 30 years clearly indicates that there is no one 'best', correct, most efficient, or most profitable system. This has to be expected as many variables need to be considered in constructing and evaluating production methods. Some of these variables are discussed below.

- Bull behavioural traits
    - Anti-social riding and fighting

- Physical constraints
    - Topography – contour of the land
    - Fertility
    - Weather – summer dry, winter wet
    - Pasture growth curve – annual and seasonal

- Economic and Financial
    - Labour productivity/availability
    - Cost of procuring animals
    - Cost of feed supplementation
    - Risk acceptance/aversion

- Personal Influence
  - How intensive does the farmer want to become?
  - Lifestyle
  - Risks of intensification – personal aversion to risk
  - Knowledge/ ability of manager

There are also key drivers in any bull beef system that is inextricably linked to profitability and efficiency.

- Maximising pasture growth
- Maximising pasture quality
- Maximising pasture utilization
- Maximising grass used for growth versus maintenance

In considering production systems it is assumed we are operating in a commercial farming situation where net return ($/ha) is a more appropriate yardstick than production (kg LWT/ha).

5.1 Development of Production Systems

During a span of 20 years from 1969, eight farmlet scale experiments conducted by Dr Ray Brougham in the Manawatu used a simple system of grazing management. These experiments tested the principles of pasture growth and utilization in realistic livestock systems based on the production of bull beef from dairy industry calves.

This series of experiments tested whether the requirements of pastures could be integrated with the feed requirements of animals, and demonstrated the production potential from efficient utilization of pasture. Factors at the time that provided relevance and context for this research included the emerging export market for bull beef and the opportunity this presented for reducing wastage of dairy industry male calves, the high LWG and feed conversion efficiency of friesian bulls and the support from government agencies, farmers, consultants and the science community for testing and developing pasture management principles within realistic livestock systems.

With a stocking rate of 7.4 friesian bulls to the hectare, over a period of 16 years, these trials showed an average LWG of 2000kg/ha. These high yields remain a benchmark in terms of the biological efficiency of growing and converting pasture to animal product, although the economic optimum was at a lower stocking rate and level of output (Cosgrove, Clark & Lambert, 2003).

These trials gave an insight into the potential of dairy industry bulls, while importantly recognizing that the most profitable commercial stocking rate was somewhere below the 7.4 bulls/ha. They also explored strategies to better align feed supply with demand. Many of which have become fundamental in production systems of today. Technosystems, for example, have their foundation in this trial work.

Having acknowledged that the optimum commercial stocking rate lay somewhere below 7.4/ha, the challenge for the industry was to determine where in fact it lay. To this end many farmers at the time were focusing on stocking rate through what could be termed trial and error or more correctly via commercial experience and outcomes.

Massey University also took up the challenge of furthering our knowledge of bull beef production by setting up their Tuapaka Beef Unit in 1982. This was established by separating 109 hectares of predominantly flat land from what was previously a sheep and beef property. The primary objective for the unit was to design and implement a bull beef system in order to profitably utilize the heavy clay soils of the Tuapaka flats. It also provided the university with the opportunity to study bull beef as a beef production option.

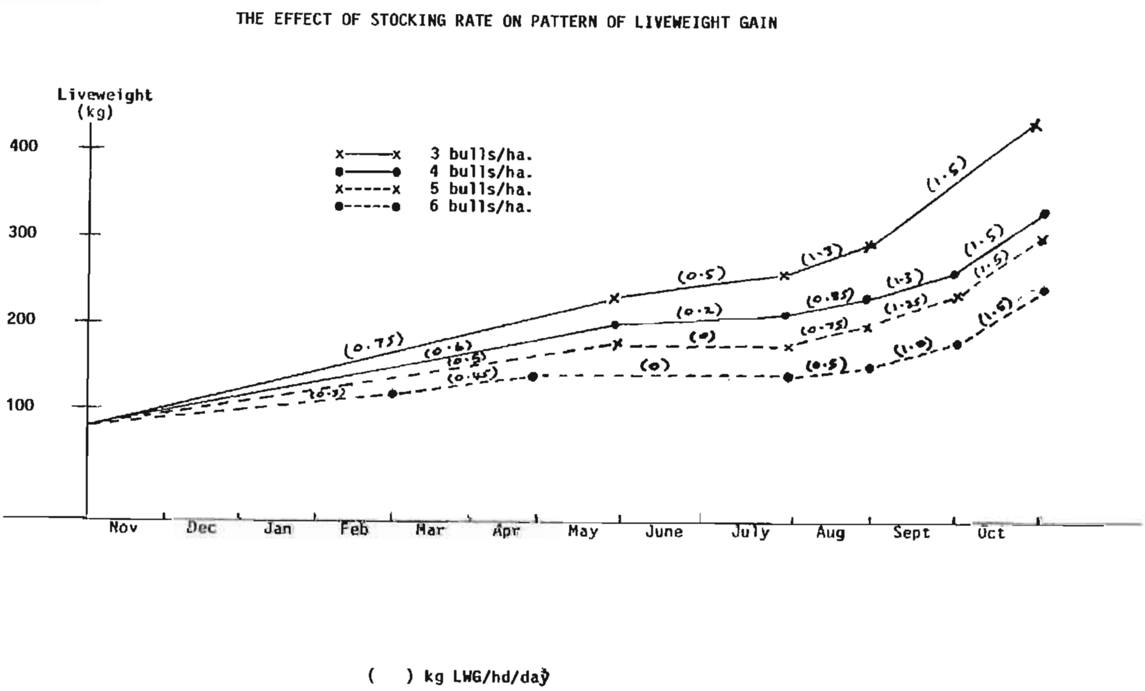
Studies completed at the university looked at a range of production systems including spring purchased calves in a 1year system at stocking rates varying from 3 to 6 bulls/ha; 2 year systems where half the 5 bulls/ha are slaughtered and replaced each year necessitating carrying the animals through 2 winters; systems that included autumn purchases of replacement stock; and systems that were combinations of the above.

These studies indicated that a bull beef system based on what was then considered a relatively low stocking rate of 3.7 bulls/ha was as profitable as any. This led to the implementation and monitoring of such a system (McRae and Morris, 1984).
The following is a description of the system, the results and evaluation.

5.2 Tuapaka System

All replacements are bought as 3 month old weaned calves in November. They are grazed through to slaughter at 15-20 months of age. Thus each November there are 15month bulls plus replacement calves on the unit. The higher these animals are stocked on the given pattern of feed supply, the lower will be their average daily LWG. This in turn leads to lower average slaughter weights since the need to feed the replacements prevents all the older animals staying on the farm during the summer when there is less feed available. The effect of the stocking rate on the pattern of LWG for the given feed supply is shown in graph 4 below. A summary of the net beef production associated with each of these stocking rates is presented in table 2.

Graph 4:



Source: McRae and Morris, 1984

Table 2: Production and Financial Data for System Involving Spring-Purchased Weaners

Stocking Rate (animals/ha)	**3**	**4**	**5**	**6**
Average carcass weight (CW) at Slaughter (kg)	270	231	203	174
CW sold/ha (kg)	811	924	1,015	1,044
CW bought/ha (kg)	120	160	200	240
Net beef production/ha (kg)	**691**	**764**	**815**	**804**
Average Carcass value at Slaughter*	$502	$414	$347	$267
Replacement cost/animal	$135	$135	$135	$135
Profit margin/animal	$367	$279	$212	$132
Net Profit/ha	**$1,101**	**$1,115**	**$1,062**	**$794**

*based on the Hawkes Bay schedule as at 1/3/84.

Source: McRae and Morris, 1984, p.18

Therefore at the stocking rate of 3.7/ha the data would suggest an average carcass weight (CWT) of about 235kg.

Actual results fell well short of predictions with a CWT of 212kg. Possible reasons identified for this discrepancy include an inability to control animal intakes under a winter set stock regime leading to a rapid fall in pasture cover to the point where animals could only harvest sufficient feed for maintenance. These low covers affected pasture growth rates exacerbating the problem.

In response the second year of Tuapaka saw the stocking rate lowered to 3.3/ha. Extra pasture was accumulated prior to the winter of 1984 and animals were rotationally grazed to ration feed. This maintained higher pasture covers through to the end of June when once again animals were allowed to eat to appetite by set stocking. The resultant average CWT for the 330 bulls was 231kg.

The subsequent 2 years saw a stocking rate of 3.4/ha and while the 1984-85 year saw the highest CWT to date at 237kg, the fourth year at Tuapaka saw a disappointing result of just 208kg. Once again climatic conditions and winter grazing management were identified as key reasons for the lower production (McRae, 1987).

After 4 years experience and data gathering and with mixed performance, it became apparent that the stocking rate of 3.4 bulls did not provide the production system with enough flexibility to adjust to adverse climate conditions. Therefore, it did not offer the opportunity to attain the highest net profit/ha.

5.2.1 Tuapaka – a new direction

When the Tuapaka unit was set up, the then stocking rate of 3.7/ha was considered relatively light. However, in the intervening years many commercial farmers had moved to even lower stocking rates and had lifted both LWG and net return per hectare. This, along with Tuapaka's experience over 4 years encouraged them to adopt the lower stocking rate of 2.8/ha. Table 3 shows the relative margins for different stocking rates.

Table 3: Sales less Replacement Margin for 5 Stocking Rates

Stocking rate (bulls/ha)	LW at slaughter (kg)	Dressing-out %	CW at slaughter (kg/hd)	Average* price (c/kg CW)	Sale value $/hd	Replacement cost $/hd	Margin per animal ($)	Margin per ha ($)
4	443	50	222	1.99	441	210	231	925
3.5	486	50.8	247	2.01	498	210	288	1007
3.15	559	51.5	288	2.08	599	210	389	1225
2.80	499	52.4	314	2.12	666	210	456	1276
2.40	641	53.0	340	2.16	734	210	524	1257

* Schedule payments used (net)
195 – 220kg: $1.92/kg CW
220 – 245kg: $2.00/kg CW
245 – 270kg: $2.04/kg CW
270 – 295kg: $2.08/kg CW
295 – 320kg: $2.12/kg CW
320 – 345kg: $2.16/kg CW

Source: McRae, 1987, p.30

While no further data has been published from Tuapaka, the rationale for moving to lower stocking rates and attaining higher individual animal performance is important in understanding the development of bull beef farming in New Zealand.

5.3 Two Year Old Bulls

Farming older bulls goes against the principle of lowering the FCR. "The relative growth potentials tell us that for every 100kg of growth on a yearling bull, we would achieve only 50kg of growth on a 2yr bull for the same amount of feed eaten per hectare" (McCall, 2005, p.3).

While this fact would tend to dismiss older bulls in practical commercial farming operations, they offer possible advantages in:

- Greater pasture utilization due to higher intake capacity
- Greater ability to handle lower quality grass (clean up mob)
- Flexibility in growth rate pattern- can experience a period of low growth rates but still reach good CWT
- Flexibility in purchase and sale dates
- Good fit to technosystems

It appears that margins on 2yr bulls have fallen the past few years. Neil Aicken, a Meat and Wool NZ monitor farmer in the Waikato wintering 1700-1800 head of cattle normally aims for a margin of $400 to $500 a head on most bulls. In 2005/06 trading margins were 20-30% lower than expected, resulting in a "disappointing" margin of $310/head. Replacement costs however did not track down (Bland, 2006).

This could be a result of factors such as a greater proportion of bulls being slaughtered at 18mths leaving less for the store market or simply more farmers wanting to farm 2yr bulls. Thus creating a greater demand for the 400kg store bull pushing up the price farmers need to pay to source them. In the absence of any data on the age of bulls when slaughtered it is difficult to draw any definite conclusion, other than to state that farmers will make commercial decisions and farm the age of bull that best fits their system and offers the best return.

As is evident from table 4 the relative profitability of 2yr bulls versus 1yr bulls is very sensitive to the replacement cost of the 2yr old. The table does not reflect the lower carrying capacity of older bulls.

Table 4: 1yr bull versus 2yr bull net margin/ha comparison

	1 Year Bull	2 Year Bull	
Sale Price			
270kg CWT @ $3.10/kg	$837		
350kg CWT @ $3.25/kg		$1137	$1137
Purchase Price			
100kg LWT@ $3.50/kg	$350		
400kg LWT @ $1.60/kg		$640	
400kg LWT @ $1.90/kg			$760
Margin per Hd	$487	$497	$377
Margin per Ha			
@ 2.5/ha	$1217	$1242	$942
@ 3.0/ha	$1461	$1491	$1131
@ 3.5/ha	$1704	$1739	$1319

5.4 Technosystems

Farmlet based research led by Dr. Brougham showed that grazing management could significantly raise production levels in dairy bull beef production (Cosgrove et al, 2003).

Broughams research encouraged Harry Weir, a Rangitikei farmer to develop a new system for bull beef production based on Broughams findings and commercialized this concept as 'Technograzing™' in 1992 (Charlton and Wier , 2001).

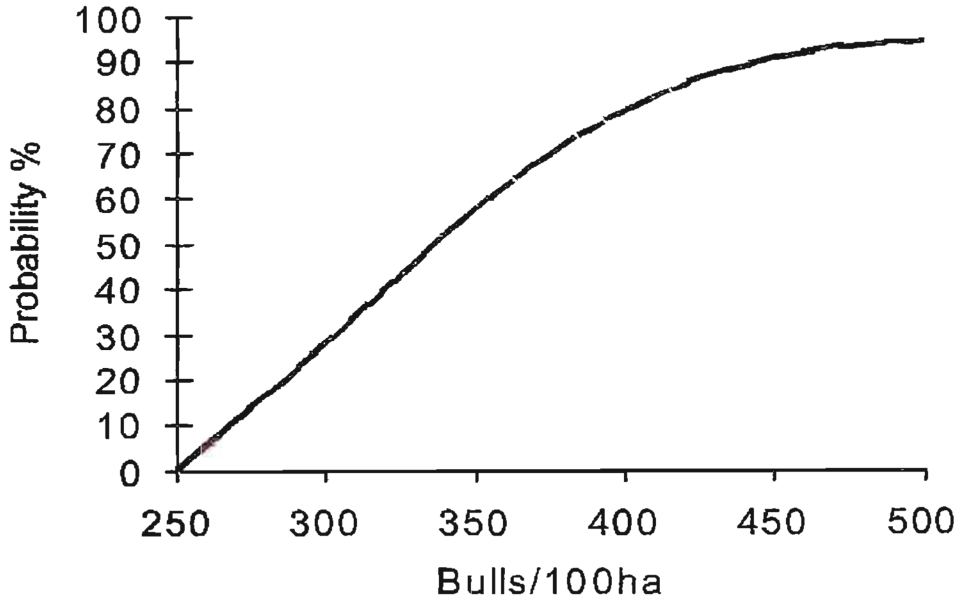
Technograzing™ is a grazing management system that offers a very high level of control over animal intakes and pasture management. Ideally easy contour land is used for a technosystem, however the concept can be implemented on hill country. A number of long parallel lanes are set up with permanent electric fencing. Temporary electric fences cross these lanes to form small grazing cells of less than 0.1ha. Portable water troughs provide stock water. Small mobs simultaneously move along each of the lanes with daily or alternate day shifts. One temporary cross fence runs through the adjacent lanes meaning shifting a single wire moves a number of mobs. A back wire prevents bulls regrazing or treading previously grazed area. The level of control inherent in this system enables high stocking rates of bulls (5/ha and higher) to be wintered. Restricted intakes and modest LWG over winter enable high pasture utilization and LWG over the key spring/summer period.

The concept of technosystems offer:

- Intensive grazing management
- Small mob numbers means less stress
- High level of control
- High stocking rate
- High profitability
- Good pasture utilization levels
- Increases pasture production

A cost benefit analysis comparing a traditional bull beef system to a Technograzing™ system shows a significant lift in return on total capital invested. High probabilities (greater than 80%) of gaining a net worth better than the traditional system depend on achieving a final stocking rate of 4.0 bulls/ha or a marginal increase from the traditional system of 1.5 bulls/ha. If final stocking rates are only 3.5 bulls/ha the probability drops to 58% (Ogle and Tither, 2000).

Graph 5: The Probability that the net worth at year 10 will be greater than the Traditional system if development increases total stocking rates



Source: Ogle and Tither, 2000, p.25

Graph 5 above shows that the probability of net worth at year 10 being greater under the Technograzing™ system than the traditional system increases with the stocking rate.

5.5 My own experience

I have been involved in farming bulls for 30 years and have developed a sustainable 18 month system targeting high LWG and an average CWT of 300kg. While our system is not 100% bull beef as there is complementary cropping, bulls are the sole class of livestock grazed. I believe the results demonstrate what is achievable with a stocking rate of 2.5 bulls/ha.

5.5.1 My system

The system that I have developed is a 1 year system where 90% of the calves are reared from 4 days old with the remainder bought as 100kg weaners in November. While the stocking rate of 2.5 bulls/ha is low, this rate is over the full effective farm area and approximately 20% of the farm is cropped annually with potatoes, squash, onions and maize. The objective is to have the cropping area back in production for the crucial winter months producing brassica, italian rye or new grass. Calves have absolute priority from day 1 to ensure maximum intakes of high quality grass. From November calves are placed in mobs of 20-26 depending on paddock sizes and stay in these social groupings for life. Each mob is tagged so as to identify mobs if they ever get mixed up as it is important to get them back in to their social groupings. Both the small mob size and the stable social groups help to minimize fighting and riding, two unwelcome behavioural traits of bulls. The effective stocking rate from October to January, when cropping area is out and prior to slaughtering any 18 month bulls, rises to approximately 3.1 calves plus 3.1 yearling bulls per hectare giving an overall stocking rate of 6.2/ha. It is policy to slaughter approximately two-thirds of the yearlings by the end of January.

The rationale for this includes:

- The desire to be proactive and slaughter when I want to rather than when I am forced to.

- High stocking rate with replacements on and cropping areas out necessitates positive action.
- Often procurement premiums that are available in January disappear later.

Bulls are slaughtered by mob unless there is a very good reason not too. The theory is that they have had every opportunity to grow, so why keep poor performers necessitating the mixing of social groups.

Calves, which are grazed in small mobs of 20-26, are given absolute priority over older stock. Paddock size varies from 1.5 to 3ha and mobs are loosely rotated around paddocks with some rotational grazing behind wires through the winter if required.

Nitrogen is used strategically in autumn to build pasture covers and haylage, conserved on farm, is fed in autumn/early winter to maintain covers under adlib feeding. Some topping of pasture is undertaken to maintain quality through the summer if necessary.

5.5.2 Evaluation of the system

There are pros and cons associated with the system that I am currently operating. These are outlined below.

Pros:

- Flexible to allow for climatic extremes.
- Utilizes low FCR of young bulls.
- Doubles up stocking rate through spring –lifts pasture utilization.

- Cropping ensures control of grass and facilitates pasture renewal, ensuring quality high performing pasture.
- Majority of cattle sold before summer months, where LWG can be challenging. Remainder can be carried in to the autumn.
- Slaughtering cattle before pressure comes on at the processors, therefore more likelihood of receiving procurement premiums.
- Maximises grass used for growth versus maintenance.
- When slaughtering bulls, the replacements are already on the farm so margin (sales less replacements) is known.
- 12 month bulls are well grown and have the capacity for high intakes through peak grass growth period (September to December), leading to high LWG and high CWT.
- High CWT at slaughter attracts higher price/kg through graduated schedule payments.
- Less stock to purchase means lower capital entry cost.

Cons:

- Exposure to drop in schedule price as replacements are on hand before older cattle are sold (i e not buying and selling on the same market).
- LWG of 15-18month bulls is compromised from November until slaughter because calves have priority to quality pasture.
- Need for intensive management skills to drive the system.

5.5.3 Results

The following data (table 5) records the results of my system over the last 6 years. The lower number slaughtered in 2006 was a result of cropping taking some area out for a full 12 months. For the 2006-07 year calf numbers have been increased to 550 with a reduction of cropping anticipated.

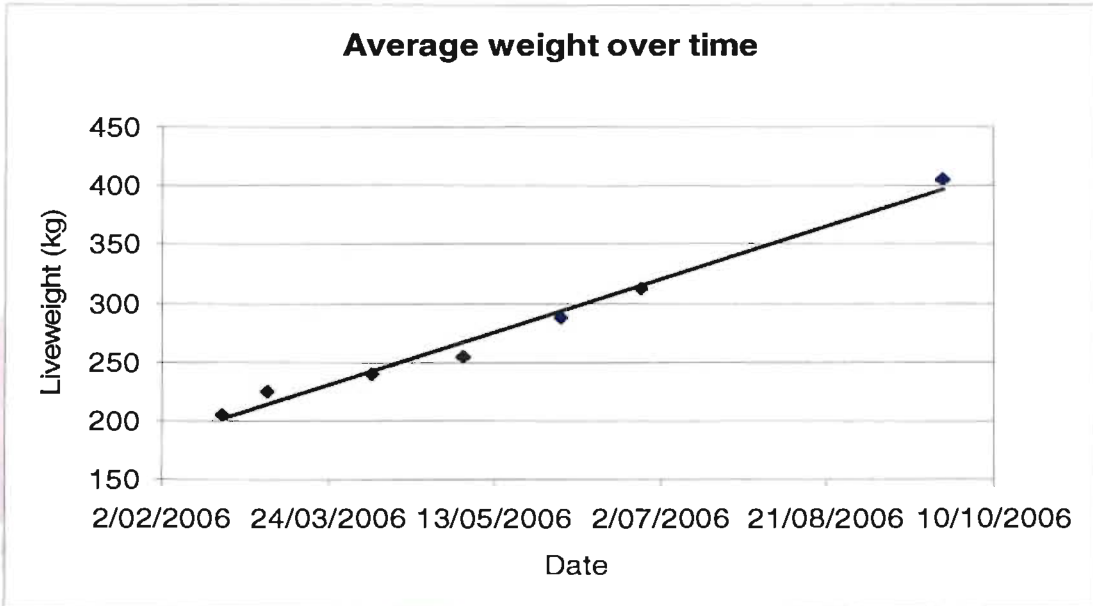
Table 5: Output Data from My System

Year	**Number slaughtered**	**Mean Killing date**	**AverageCWT (Kg)**
2001	382	Feb 7	299.9
2002	412	Feb 8	298.4
2003	402	Mar 16	309.0
2004	459	Feb 13	298.5
2005	487	Feb 19	307.6
2006	419	Jan 29	279.2

Weighing scales have not been part of the management system although the last year has seen calf growth rates monitored to plot growth paths and set benchmark LWT targets. I believe growth rates to 1 June are critical in achieving an animal with the potential for attaining a CWT above 300kg at 18 months of age. I am of the opinion that we as an industry underestimate the growth potential of young bulls and as a result often accept mediocrity.

To test this, four individual mobs of 20 weaner bulls were weighed periodically from February through to October. Average liveweight over this period of 250 days increased from 204kg to 405kg. This equates to a daily LWT gain of 0.80kg /day and places the bulls in a good position to achieve carcass weights of above 300kg by January. Average liveweight of the 80 weaners are plotted on the following graph.

Graph 6: Average Liveweight of weaner bulls



5.6 Key Principles Common to Efficient Production Systems

The further we investigate pasture based production systems the more evident it becomes that there is no best way. On the surface you could be forgiven for thinking that producing beef is as simple as feeding grass to cattle. However, to do it efficiently and profitably requires a knowledge and understanding of key drivers, along with skilful management.

Given that the New Zealand bull beef industry is primarily pasture based, the principles we need to consider are:

- Maximising economic pasture production.
- Maximising pasture quality
- Maximising pasture utilization
- Maximising pasture used for growth versus maintenance

Each of these principles is discussed below.

5.6.1 Maximising economic pasture production

Factors within our control that influence pasture production are:

- Optimal soil nutrient levels
- Pasture renewal with improved cultivars
- Subdivision
- Pasture management – residual grazing levels; avoid overgrazing; and avoid pugging
- Strategic nitrogen use
- Irrigation

5.6.2 Maximising pasture quality

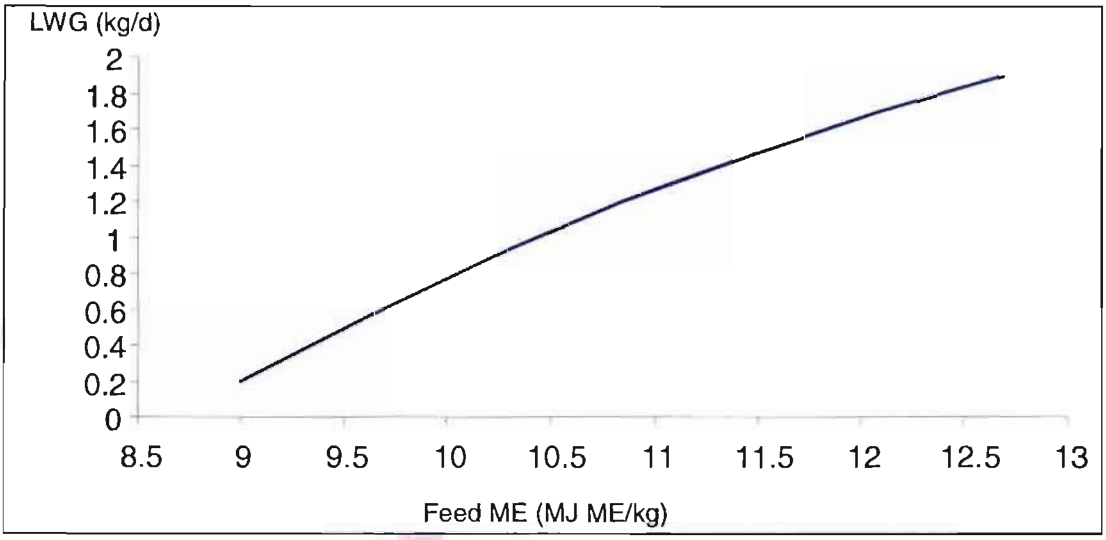
High quality pasture is characterized by:

- High content of green leaf
- High clover content
- Low stem and dead matter
- Herbage is 'young' (Recently grown)

- High ME levels
- Grazing animals can select a high quality diet

It is well documented that as pasture quality increases, so does LWG. The following graph illustrates this point.

Graph 7: Bull LWG versus Feed ME



Source: Litherland, 2001

Furthermore low quality pasture can not be compensated for by high quantity. As pasture quality drops, each kg of dry matter (DM) has less ME and also animal intakes drop.

5.6.3 Maximising pasture utilization

Stocking rate has the dominant effect on pasture utilization rate. Increases in stocking rate result in increased pasture intake per hectare. Only at a very high stocking rate does intake decline because pasture production is limited by overgrazing. Of course as stocking rate increases animal growth rates decline. Stocking rate analysis using feed budgets or computer models invariably show that high levels of per head performance are important to profit (McCall. 2005, p.1).

Brougham, in his farmlet trials, achieved very high pasture utilization with stocking rate of 7.4 bulls/ha doubling up with 7.4 weaner calves from spring. Yet while the trials produced 2000kgLWT/ha, the stocking rate was acknowledged to be above an optimum profitable commercial stocking rate.

More lightly stocked systems are often dismissed because they will not fully utilize surplus spring pasture however feeding tables show that a 400kg bull gaining 1.5kg/day LWT requires about 11kgDM/day. At 3.5bulls/ha, this represents a daily feed requirement of 38.5kgDM/ha. A 500kg bull gaining 2kg/day LWT requires nearly 16kgDM/day. At 2.8 bulls/ha, this represents a daily feed requirement of 45kgDM/ha. This effect shows that lighter stocking rates need not result in lower feed consumption through periods of surplus (McCrae, 1987 p.39).

High levels of pasture utilization should be the objective when devising a system but not to the point where advantages of high utilization are offset by high level of feed going to maintenance instead of growth.

Finding the balance that suits a particular set of parameters is key in achieving profitable beef production from pasture. As an example, a strength of Technograzing™ lies in its ability to finely tune the balance between pasture utilization and growth versus maintenance.

5.6.4 Maximising growth versus maintenance

Under pastoral grazing feed intake is important because it influences the ratio of feed going to maintenance and growth. A 300kg bull growing at 1.5kg/day requires 6.4kgDM/kgLWG whereas the same animal growing at 0.5kg/day will require 11.0kgDM/kgLWG. The most efficient conversion of pasture to LWT occurs when bulls have high growth rates. This is because before a bull can grow, its maintenance requirement must be met. The greater the feed intake the greater the percentage of total feed that goes to growth. In the example above, maintenance requirements were 3.8kgDM/day. Therefore, the bull growing at 1.5kg/day was using 39.6% of its feed for maintenance whereas the bull growing at 0.5kg.day used 69.1% of its feed for maintenance (McCall. 2005, p.2).

Another way of displaying this is by taking the same 300kg bull and growing it out to 600kg LWT. Every extra day the bull takes to reach 600kg means an extra day of maintenance feeding is required greatly increasing total feed consumed. The following table shows feed conversion efficiencies at differing growth rates.

Table 6: Feed conversion efficiency for 300kg bull growing to 600kg

Feed Quality (MJME/kgDM)	Bull LWG (kg/d)	Weeks to finish	Feed Efficiency (kg DM/kg LWG)	Feed required	Return cents/kgDM
9	0.4	113	20.4	6123	7
10	0.98	44	10.7	3209	14
11	1.47	29	8.0	2423	18

Source: Litherland, 2001, p.1

Another strategy of improving the maintenance versus growth equation is to farm a class of stock that have a low Feed Conversion Ratio so that for a given quantity of feed a greater percentage will be used for growth. Bull beef systems that start with lighter (younger) animals have a potential advantage over those that start with heavier and older cattle (Morris, 2003).

However young bulls growing quickly soon become heavier and thus less efficient feed converters. Bulls that do not grow as quickly through the winter will be smaller and therefore more efficient over the spring/summer period when most LWT gain is achieved. Given similar intakes in spring lighter bulls achieve greater growth rates because a higher percentage of feed is used for growth. The result of this compensation is that annual conversion is about the same irrespective of animal growth rates over winter (McCall, 2005).

In a commercial farming scenario faced with a period of high pasture growth, conversion efficiency may not be as important as a bull's capacity for high feed intakes. Thus utilizing the surplus grass and ultimately achieving higher carcass weights.

Growing bulls as quickly as possible, while maximizing pasture utilization appears to offer high opportunity for developing a profitable bull beef operation.

Chapter 6 - Industry Threats, Opportunities and Issues

Any dynamic industry faces threats, opportunities and issues. An industry's challenge is to mitigate threats, grasp opportunities and handle issues. Some of these faced by the bull beef industry are identified and discussed below.

6.1 Threats facing the industry

6.1.1 South American Beef Production

Meat and Wool New Zealand chairman Jeff Grant has identified South American beef production as the most serious threat to the NZ industry (Keane, 2006). This threat emanates from the large cattle herds of Brazil, Argentina and Uruguay, collectively estimated at 250 million. There are issues with foot and mouth disease in the region and a lot of beef is consumed locally however there is the potential through the adoption of better farm management practice to increase production resulting in higher export levels competing with New Zealand.

Upon comparing the Uruguayan and NZ industries it is evident they have some similarities yet also many differences. Each country has a climate conducive to pastoral farming where animals can be grazed outdoors year round. In Uruguay 11.5 million cattle graze 10.5 million hectares growing 46kg beef per hectare per year while in NZ 4.1 million beef cattle graze 1.8 million hectares producing 288kg beef per hectare per year. Both countries beef industries are export focused with Uruguay exporting approximately 60% and NZ 80% of total production (Serra, Woodford and Martin, 2005).

Uruguay has limited low tariff entry to the important North American market with a 20,000 tonne quota against New Zealand's 213,402 tonne. This means the largest portion of the 228,000 tonnes marketed in the USA in 2004 (Serra et al, 2005) attracted a 26.4% tariff significantly reducing returns to Uruguayan producers. How will New Zealand farmers fare if and when South American countries overcome foot and mouth disease, lift their on farm performance and attain equal or even preferential access to markets?

6.1.2 Exotic disease outbreak

New Zealand is fortunate in that it has never experienced an outbreak of foot and mouth disease or any cases of BSE (Mad Cow Disease).

Modeling undertaken by the Reserve Bank of NZ and Treasury, under the scenario of a foot and mouth disease (FMD) outbreak that is confined to the North Island of NZ, suggests the cumulative loss in Gross Domestic Product (GDP) would be about $6 billion after year one, and around $10 billion after two years. The loss would continue to increase because potential output would be permanently lower (Greeben, Woolford, and Black, 2003).

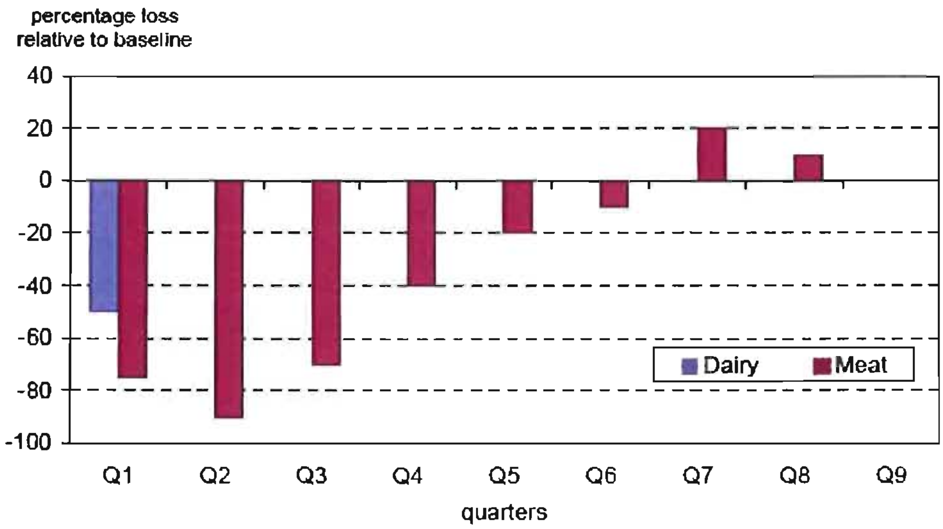
Table 7: Cumulative impacts of foot and mouth in New Zealand

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Loss in nominal export values	Cumulative $m	-1250	-1900	-2650	-3450	-4300	-5100	-5150	-5100
	Cumulative % of annual nominal exports	-3	-5	-6	-8	-10	-12	-12	-12
Loss in nominal GDP	Cumulative $m	-1600	-3100	-4650	-6100	-7600	-9050	-9950	-10650
	Cumulative % of annual nominal GDP	-1	-3	-4	-5	-6	-7	-8	-8

Source: Greben et al, 2003

This finding brings into clear focus the disastrous consequences of an incursion of FMD into New Zealand, highlighting the importance of Biosecurity NZ being well funded and focused so all possible steps to prevent an outbreak are taken. Graph 8, The Impact on Dairy and Meat Volumes, underlines how the meat industry would bear a disproportionate share of the losses.

Graph 8: The Impact on Dairy and Meat Volumes of Foot and Mouth in New Zealand



Source: Greben et al, 2003

6.1.3 Land prices

The lift in land prices to historically high levels has been welcomed by many land owners as they have seen their net worth increase. High land prices however have the effect of reducing return on capital invested and ultimately make the industry less competitive internationally. "Sheep and Beef farm profitability has steadily declined over the past 25 years and is now below 2% (Davison, 2005). Davison (2005) also showed how land prices are now disassociated with returns from farming; using 1990-1991 figures as a base index year, land prices in 2004-2005 are five times 1990-91 levels while profit/ha is just two and a half times higher" (Davison, 2005, as cited in McDermott, Smeaton, Sheath and Dooley, 2005, p. 81).

6.1.4 Food safety scares

Internationally consumer awareness of, and interest in the safety of the food they are eating has increased exponentially over the past decade. This has largely come about by the reporting of international food scares. New Zealand's food safety programmes and assurance systems are recognized around the world and are a strength, however they are assurance systems and as such cannot be 100 percent foolproof. This leaves the New Zealand bull industry exposed to the possibility of a food safety scare. However remote the possibility, the consequences could be very damaging.

6.1.5 'Green Taxes'

As New Zealand is a long way from many of its markets the food miles concept has the potential to damage New Zealand exports if it gains credibility in the market place. The theory of food miles is that the further food has to travel to market the worse its impact must be on the environment, therefore promoting the purchase of food from as near to the point of consumption as possible.

Research carried out at Lincoln University however found that production of New Zealand's agricultural exports are more energy efficient than those produced in Europe and produce less emissions even after including their transport to market (Saunders, Barber, & Taylor, 2006).

This research challenges the principle of food miles and New Zealand must continue to push its case. However even if food miles only becomes part of the consumer psyche and is not implemented in any official form, it has the potential to influence buying decisions and in so doing hurt New Zealand exports. Manufacturing beef is not presented to the consumer as 'NZ beef' in the way we see a NZ apple or kiwifruit marketed therefore we as an industry are not as exposed to the whims of the consumer.

The concept of food miles highlights the likelihood of New Zealand exporters facing more non-tariff trade barriers in the future. Similarly the introduction of forms of carbon tax is gaining traction with governments around the globe. The biggest danger for the NZ bull beef industry is under the scenario where the NZ government decides to be world leaders and legislate for some form of carbon tax, long before our competitors in South America, Australia or the USA. This would have the effect of reducing the industries international competitiveness and reduce returns to the producer.

6.1.6 Change of land use

New Zealand has limited pastoral grazing land and competition from dairying, horticulture as well as urbanization is reducing the area available for bull beef. Productivity gains and the cyclical nature of bull numbers make it difficult to quantify the effect this competition may be having on the bull industry. However total beef production is forecast to fall 16% from 2004 to 2007 (MAF, 2004).

6.1.7 Exchange rate

While the $NZ exchange rate has a dramatic effect on returns to the producer it is not something that can be controlled and for that reason has not been discussed at any length in this report. Individual farmers have used forms of 'hedging' but this has not been common practice in the industry to date.

6.1.8 Drop in consumption of manufacturing beef.

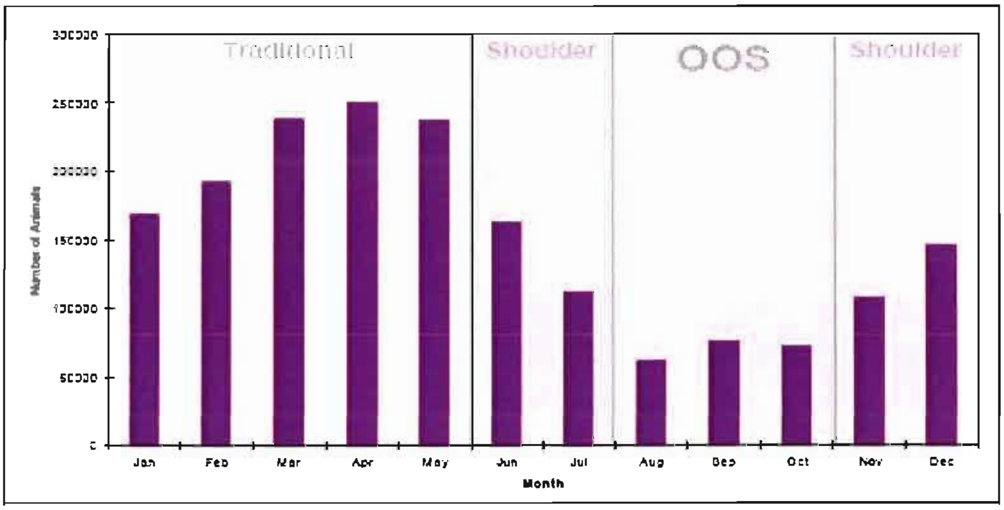
Manufacturing beef consumption is linked with the fast food industry and as such is exposed to any consumer trends away from "unhealthy" eating. Only time will reveal if this will be a factor in the future. Westernization of Asian countries however and their desire to consume western foods would seem to provide ample opportunity for the humble hamburger in the foreseeable future.

6.2 Opportunities for the future

- Lift on farm productivity – both per hectare and per head
- Add value by further processing
- Develop more co-products and embrace the Functional Food and Nutraceutical properties of red meat
- Selected young beef grade - Extract more prime cuts from bull for sale as table beef
- Increase use of technology on farm
- Supply more out of season (OOS) beef – The seasonality of supply to the processing companies makes it difficult to maximise efficient utilization of processing facilities. By moving away from the ad-hoc system of procurement premiums and providing farmers with some certainty by publishing schedules or contracting cattle for OOS supply would help in attaining a more even flow of cattle year round, benefiting all stakeholders in the industry.

Graph 9 offers a definition of Out of Season, shoulder and traditional beef production periods, relative to the average number of beef cattle harvested between 1991-1994.

Graph 9: Average Annual Beef Slaughter Profile (1991-1994)



Source: Sherlock and Parker, 1998

6.3 Issues facing the industry

6.3.1 Traceability

Traceability from paddock to plate is a prerequisite of a robust food safety programme. The NZ Government has signaled the introduction of mandatory animal identification from sometime around 2007. At present 'The Animal Identification and Traceability Governance Group' is working on implementation of the concept. The ability to track cattle from birth to slaughter will have positive benefit in areas of biosecurity, market access and food safety.

Chapter 7 - Industry Weaknesses and Strengths

7.1 Weaknesses

The lack of detailed knowledge farmers have about their businesses is a weakness in the industry. "Few farmers know: how much grass is grown annually, what it costs to grow it i.e. cents per kilo dry matter (kgDM) or more accurately cents per megajoule of metabolizable energy (MJME), how much is harvested, the feed conversion ratio of grass to liveweight, and the cents returned per kgDM consumed. Most competitors, whether beef, alternative proteins such as chicken or pork, or the grain and vegetable industries all their costs, when they're making or losing money, and at what rate. Good information for both tactical and strategic decision making is a real industry weakness" (McIvor, 2003 p.18).

7.2 Strengths

- Farmer expertise and innovation
- International recognition of New Zealand's food safety systems
- Absence of exotic disease such as foot and mouth and BSE (Mad cow disease)
- High Quality processing facilities
- Ready supply of calves – Many of the strengths, weaknesses and opportunities discussed in this report, it could be said, are common to the wider beef industry per se. The ready supply of suitable calves however is a strength unique to the bull beef industry and underpins the entire industry. It was a catalyst for its development and facilitates the rapid build up of numbers in times of high demand for beef. It is

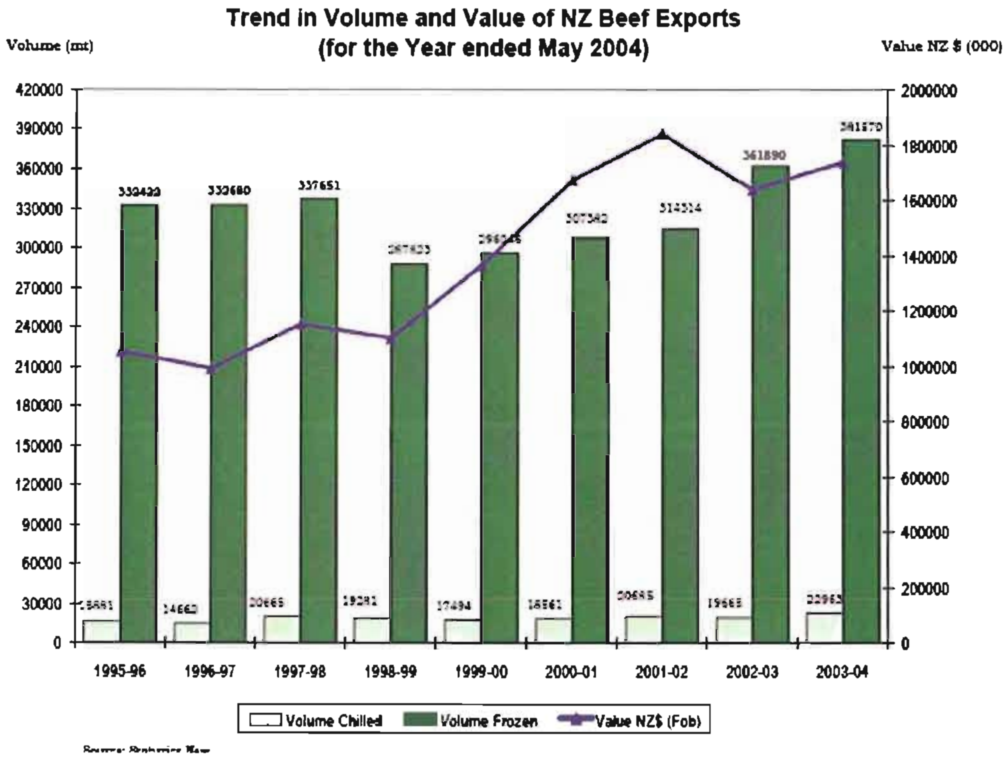
interesting to note that prime beef producers are now encouraging dairy farmers to mate surplus cows with beef type bulls so as to provide more calves matching their requirements.

Chapter 8 - Conclusion

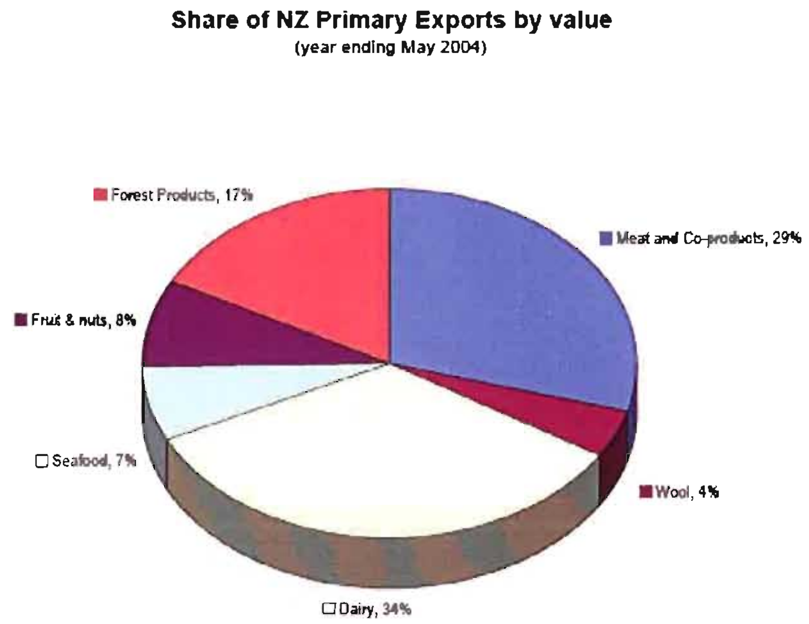
The New Zealand bull beef industry has been an exciting addition to the mix of agricultural enterprises in NZ. The industry today has matured to a point where it is contributing significantly to the NZ economy. While the steady growth in bull numbers we saw through the 1970s and 1980s has not been sustained over the past 15 years, bull numbers have, and will continue to rise and fall as they track the global demand for beef. On farm emphasis has switched to growing bulls faster and to heavier weights while ensuring efficient utilization of feed. Farmer expertise and innovation, a recognized strength of New Zealand agriculture, has led to production gains which have added value to industry stakeholders.

Continuing to lift productivity, an ongoing focus, may not be sufficient to ensure international competitiveness. Rising land prices and changing land use in New Zealand together with rising South American beef production will challenge the industry over the next 30 years. Maximising the value captured from each bull will be pivotal in maintaining profitability. This will be achieved by growing that bull efficiently on farm and then processing and marketing its beef and co-products so as to realize their full potential.

Appendix A: New Zealand Beef Industry Data

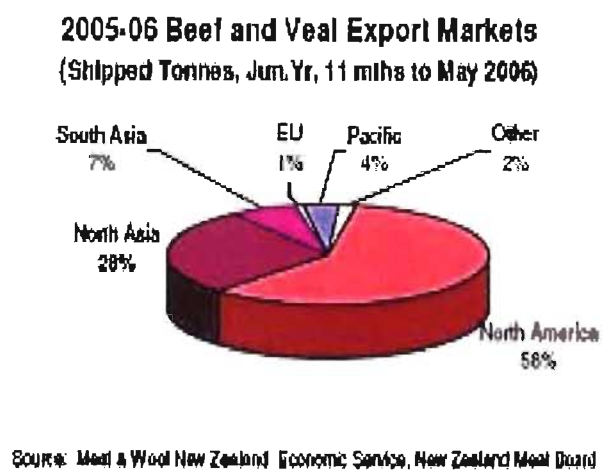


Source: Statistics New Zealand



Source: Meat and Wool New Zealand Economic Service

Beef & Veal Markets



North America accounted for 58 per cent of beef exports followed by North Asia as the next largest market region with 28 per cent of this trade. Within North America the US accounted for 51 per cent of beef exports and Canada 7 per cent.

While the US took 51 per cent of shipments it accounted for 46 per cent of beef export receipts as the US demand is dominated by shipments of processing beef. Shipments of beef to North Asia were Japan (10%), Korea (11%) and Taiwan (7%). These countries combined accounted for 33 per cent of beef export receipts reflecting a high value component of the product shipped.

Beef FOB Outlook

FOB Value of NZ Beef Exports

Jun Year	Shipped Tonnes (000)	Beef Meat $/Tonne	Beef Meat $m	Co-Products $m	Total Beef $m	Beef Meat %
2000-01	376.7	5,138	1,678	457	2,135	79%
2001-02	332.1	5,480	1,820	458	2,278	80%
2002-03	353.5	4,396	1,554	403	1,957	79%
2003-04	414.0	4,412	1,827	487	2,314	79%
2004-05	399.8	4,505	1,802	503	2,305	78%
2005-06e	348.7	4,658	1,624	432	2,056	79%
2006-07f	377.8	4,880	1,844	490	2,334	79%

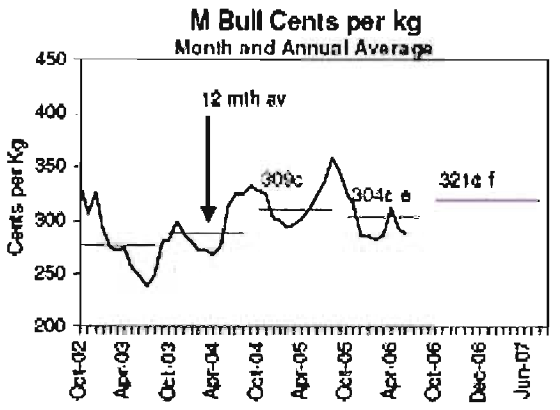
e estimate; f forecast
Source: Meat & Wool New Zealand Economic Service, New Zealand Meat Board

In the US, prices for lean ingredient beef reached record levels in the US in recent years as the liquidation phase of the US beef cattle cycle ended and US beef farmers began retaining heifers in response to strong cattle profitability. In addition, beef demand was strong. Subsequently, as domestic beef production increased, supplies of lean beef increased and prices fell. For 2006-07 the US manufacturing beef price is forecast to fall 3.0 per cent and follows a 5 per cent decrease from 2005-06.

Beef export receipts including hides and other co-products totalled an estimated $2.06 billion in 2005-06. This was a decrease of $249 million (-10.8%) on the previous year. The main driver of this was a 9.9 per cent decrease in the beef meat export receipts. While the tonnage of beef exported was down 12.8 per cent on 2004-05 this was offset to some degree by the beef FOB price per tonne lifting 3.4 per cent.

In 2006-07 the key markets of North Asia (Japan/Korea) are likely to come under pressure when the US re-enters these markets currently predicted to occur in late July 2006. The increased volume from US re-entry is likely to lead price decreases. However, while there may be an initial softening of price, overall prices are expected to remain above pre-BSE levels in North Asia.

Beef Prices



Carcase 270-295 kg
Source: Meat & Wool New Zealand Economic Service

The NZ beef price for 2006-07 reflects the expectation of an easing in the US beef price. This is due to the US beef market accounting for around 50 per cent of exports and thus having a major influence on NZ farm gate prices. However, a forecast weaker NZ dollar against the US dollar than last year underpins a 5.8 per cent increase in the M Bull class (270-295 kg) to 321 cents per kilogram in 2006-07.

The weaker NZ dollar is forecast to lift season average Prime Steer/Heifer grade (270-295 kg) prices by 2.6 per cent to 341 cents per kilogram and M Cow (170-195 kg) of 5.8 per cent to 246 cents per kilogram. If the assumed exchange rates for the US weaken by a further 10 per cent then it is expected the price will rise a further 15 per cent assuming other things remain the same e.g. market prices, processing costs.

Given this background the 2006-07 outlook for beef prices is for lower offshore prices that are positively offset by a more export-favourable exchange rate.

Appendix B: Feed Tables

Feed Requirements of Growing Animals

-based on feed tables derived in P.R. Joureaux's M.. Agr. Sci. thesis.

-expressed as Kg DM from pasture assuming that the pasture is high quality with a metabolizable energy content of 10.8 M.J. ME/Kg DM.

LWG (KG/Head/day)	LWT (Kg)								
	100	150	200	250	300	350	400	500	600
0	2.1	2.6	3.1	3.5	3.8	4.2	4.5	5.1	5.6
0.1	2.2	2.8	3.3	3.8	4.2	4.5	4.9	5.5	6.1
0.2	2.4	3	3.5	4	4.5	4.9	5.3	6	6.6
0.3	2.6	3.2	3.8	4.3	4.8	5.3	5.6	6.4	7.2
0.4	2.7	3.4	4.1	4.7	5.2	5.6	6	6.9	7.7
0.5	2.9	3.7	4.3	5	5.5	6	6.5	7.4	8.3
0.6	3.1	3.9	4.6	5.3	5.9	6.4	6.9	7.9	8.9
0.7	3.3	4.1	4.9	5.6	6.3	6.8	7.3	8.4	9.5
0.8	3.5	4.3	5.2	5.9	6.7	7.3	7.8	8.9	10.1
0.9	3.7	4.5	5.5	6.3	7.1	7.7	8.2	9.4	10.7
1	3.9	4.8	5.8	6.6	7.5	8.2	8.7	9.9	11.3
1.25			6.5	7.5	8.5	9.2	9.9	11.3	13
1.5					9.6	10.3	11.1	12.8	14.6
1.75							12.4	14.3	16.2
2								15.9	17.9

Source: McRae (1987)

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