



**A Nuffield Farming Scholarships Trust
Report**

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**Beef from the dairy herd:
is integration the answer?**

Robert B.S. Drysdale

June 2016

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A Nuffield (UK) Farming Scholarships Trust Report



Date of report: June 2016

*"Leading positive change in agriculture.
Inspiring passion and potential in people."*

Title	Beef from the dairy herd: is integration the answer?
Scholar	Robert B.S. Drysdale MRCVS
Sponsor	Trehane Trust
Objectives of Study Tour	<p>Can integration within the supply chain improve the quality and consistency of UK beef, therefore increasing supply and demand. This required:</p> <ul style="list-style-type: none">• Research: how countries with a history of dairy farming deal with dairy-bred bull calves as well as any beef-bred animals.• Investigation: does integration exist at any level within the beef industry - globally, dairy or suckled - aimed to improve the supply chain management and performance.• Review: integrated business models across several agricultural markets.• Question: retailer and consumer demands from beef supply chain.
Countries Visited	Australia, Canada, Estonia, Ireland, New Zealand, United Kingdom, United States
Messages	<ul style="list-style-type: none">• As global demand for beef increases production models will need to adapt if both price and sustainability are to match consumer expectations.• Integration of dairy-bred calves into the beef supply chain can work to meet this demand.• The beef produced from dairy-bred animals should be viewed as potentially high quality, low carbon footprint and an ethically important source of meat protein.• Consistency, quality and sustainability should be the key messages of integrated beef from the dairy herd.• Differentiation is needed: dairy and single-suckled beef are two different products. The higher production cost and system sustainability of suckled beef must be reflected in a higher farm gate price, and passed on through the chain to the consumer.

DISCLAIMER

The opinions expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust, or of my sponsor, The Trehane Trust

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1.0. Executive Summary

Should population and weather trends follow current predictions how can beef remain an affordable and sustainable protein source? Even at 2014 consumption of 10.1kg per capita the predicted 9 billion world population of 2050 will mean farmers have to produce 42% more beef despite pressure on land and resources that could restrict breeding cow numbers. Where will our beef come from?

A review of data suggests dairy beef contributes a significant proportion to global production. Between 1997 and 2014 dairy cow numbers rose more than beef: 17% compared to 9%, giving 257 and 295 million respectively. In the same period beef production increased 16%, with a similar 16% rise in totals slaughtered, to 304 million head.

In 2014 the UK produced 878,000 tonnes of beef with dairy-bred animals representing 53% of the 2.5 million head slaughtered. With an average abattoir consignment of 7-10 head/load, with 7 loads/farm each year, managing carcass quality and supply can be difficult for the processor, while consistency to the consumer can suffer.

I was interested to learn if beef production could be integrated in a similar way to pork and chicken. Could integration, through scale and management processes, supply a consistent, high quality and affordable product weighed against welfare and consumer expectations? Unlike other intensively reared meats, beef takes much longer to produce – is there a model for integration that could work in the UK when considering public opinion on welfare and sustainability? What about the views of policy makers, processors and retailers on dairy-bred beef?

It was important to travel to countries where there were matched, long-standing dairy and beef industries. How do farmers in Australia, New Zealand and the US manage their beef stocks with, or indeed without, dairy-bred animals? Is there a place for more dairy beef in the UK and EU nations?

In all the countries I visited there were examples of beef integration, including the UK: from small scale operations of 80-100 head annually through to one company processing 500,000 cattle. There are several key requirements to being successful when integrating beef:

- Positive attitude of producer and processor.
- Targeting a specific market allows for better integration from dairy farm through to processor.
- Those who work both back and forwards to integrate are most likely to succeed.
- Quality and consistency of production is key.
- Managing the supply of raw material, the dairy calf, is vital for long term success.
- Breeding and genetics offer value through the chain including an income stream for dairy farmers.
- Scale is not important at farm level: scale impacts the integrated business and sales only.
- Margin expectation needs to be managed at all levels of the chain – meaning transparency of costs and returns, from calf producer through to beef processing to the retailer.

To scale an integrated system requires “sustainable intensification” where managing consistency of supply, farming practices and producer margin are recognised along with consumer demands, product branding and eating quality. It is possible to *chickenise* beef production using integration.



2.0. Why would a vet study beef production as a Nuffield Farming Scholar?

Coming from a farming and vetting family I always felt it was preordained I would become one or the other. In the end I took the easy route and became a farm vet – getting the best of both worlds in my opinion! Growing up with time split between playing rugby, helping feed calves and travelling around watching vets work was a great preparation for vet school.

My interview for Edinburgh Vet College consisted of an appraisal of the Scotland rugby team, the question “Would I play for the Vet College or University?” followed by a guided tour including the local pub. This was the place for me! During my university studies I was lucky enough to spend a considerable amount of time “seeing” farm practice when barley bulls were a common sight and the Milk Marketing Board ensured milk prices were managed for the overall industry to thrive.

Since I graduated in 1995 UK agriculture has changed dramatically: dairy herd size and cow yields have increased, the beef herd has contracted and farmers are expected to produce much more from much less, more economically. Many reasons can be cited for this intensification, though retailer and processor strength along with globalisation of farm commodities could easily be implicated, as the drive for cheaper food for the consumer has led to supply chain pressure from imports.



Figure 1: The author (on right) in his usual day job as a dairy vet

As farms evolved towards agri-businesses farm vets had to evolve with them. In July 2000 the opportunity arose for me to start a farm-only veterinary practice in Surrey and West Sussex. I still live and work in the same area, just outside Horsham, between London and the Sussex Weald. My practice grew steadily from just one vet (me) to 60 working across a large swathe of the country. In January

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale

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2014 I sold most of my share to an equity investor with the new business developing the concept of a holistic service to farmers. Westpoint Farm Vets is now the largest production animal practice in Europe covering ruminants, pig and poultry with veterinary, consultancy, nutritional and laboratory services, as well as its own clinical research and knowledge transfer divisions.

However, after all those years working for farmers, the lure to become one started to take over. When I applied for a Nuffield Farming Scholarship, the aim was to challenge myself. I wanted to look to the next 20 years of my working life, to take time out of vetting and see if I could have a future in farming. Undertaking a Nuffield Farming Scholarship has been a great experience as I have developed both personally and professionally acquiring a much more rounded, global view on agriculture.

Throughout the growth of my veterinary business, and during my Nuffield Farming travels, I have been lucky enough to be supported by my wife, Bonnie. Together we enjoy game shooting, working our team of gun-dogs and travelling. In quieter moments we can be found in the garden or watching rugby. She is now looking forward to seeing what my Nuffield Farming Scholarship means for the next chapter in our lives!



Figure 2: The travels associated with a Nuffield Farming Scholarship are not a holiday, though there are some down times. This is the author's first ever "selfie" taken outside Bag End, Hobbiton, Rotorua in New Zealand



3.0. Global beef demand is growing: can production keep up?

Globally, beef demand is rising, even though per capita consumption has remained fairly static at 10.1kg per year. Should the world population grow to 9 billion by 2050, as many researchers estimate, even at 2014 per capita consumption that means 90.9 million tonnes of beef will be required: farmers would need to produce an additional 42% compared to 2014 or an additional 26.9 million tonnes.

In the developed world beef has stagnated as a protein source whilst chicken, pork and now farmed fish have grown their dietary inclusion rates. However, according to the FAO report “World Agriculture 2030,” the developing world has seen the amount of beef per capita rise from 4.2kg/person to 7.1kg since 1965, and estimate 8.1kg by 2030 with a trend of 1kg increase every 15 years, suggesting by 2050 the global demand could be the 90 million tonnes.

The UK is predicted to consume 1.1 million tonnes of beef in 2015, against production of 878,000 tonnes. In 2014 some 141,000 tonnes were exported, offset by a balancing import of 410,000 tonnes: meaning UK domestic production was only 76.5% of total required before exports. Some 53% of UK beef already comes from the dairy herd, but with contracting dairy and suckler cow numbers the question is: where will our own come from in the future? Adding to the issue of a secure domestic supply is the pressure exerted on UK beef farmgate price by the global beef market: beef is traded globally with supply and demand impacting price, sustainability and food security. Can the UK continue to produce beef as it has in the past?

Previous Nuffield Farming Scholars have studied the beef industry: its supply routes, meat grading and future trends. There have been studies in the integrated sectors of poultry and pigs. But it seems, though, no one has addressed the potential of developing supply chains from cow to retailer that are fair and sustainable whilst offering potential for scale (increased throughput) and, to a vet, welfare friendly.

Several of my interests provided the basis for my Nuffield Farming application: dairy calf health, efficient beef production and integration of production chains, plus the love of a good steak. The experiences of working not only as a farm vet but managing a business that aimed to influence a farm’s efficiency of production through better health and welfare, whilst allowing improved profitability, prompted my study: “Beef from the dairy herd: is integration the answer?”

Dairy beef is sustainable in terms of its carbon footprint – the majority of carbon associated with a dairy cow is set against the milk she produces, not her beef calf – and has been shown to be an excellent source of protein. Welfare friendly calf rearing and the production of beef that is both efficient and profitable has been a challenge to UK farmers - but what about the rest of the world?



4.0. Where did my studies take me?

It was important to travel to countries where there were matched, long-standing dairy and beef industries. How do farmers in Australia, New Zealand and the US manage their beef stocks with, or indeed without, dairy-bred animals? What about the UK and the EU nations – how does dairy beef fit in here?



Figure 3: The author beside “Albert the Bull” -
a local symbol of previous beef prosperity in Audubon, Iowa, USA

I wanted to meet dairy farmers to discuss how they see beef bred from their cows. What is the attitude of the processors and retailers to dairy beef – do they encourage or block production? How do policy makers and other NGOs see beef produced from the dairy industry?

Integration has long been recognised in the pig and poultry sector: is there anything that could be learned from these industries? What of other agricultural systems such as milk or cropping – is there any level of integration within these sectors?

I kept a diary of my travels and feel that any aspiring Nuffield Farming Scholar should understand the commitment they are signing up to when accepting the offer.

Over the 11 weeks of travel I have been lucky enough to visit several prominent agricultural nations. On these travels, although I managed to interview a significant number of farmers - undertaking 70



separate meetings - it seems I have hardly scratched the surface of the dairy beef industry or those involved in integrated agriculture. It is important to realise that a Nuffield Farming Scholarship is one of constant learning, and this report more than likely forms the beginning not the end of this experience for me.

It would have been great to visit more of the USA than I did; or you may notice South Island, New Zealand, was completely missed off during my travels. To fit more in would have, in my opinion, affected the number and quality of meetings I was able to have in each region without extending the time I was away travelling. More importantly, would additional meetings have changed the findings or recommendations of this report? Probably not.

Travelled away from home for 11 weeks, including within the UK.
Made 26 flights including over 130 hours of time in the air.
Visited 6 countries outside the UK for study.
Slept in 34 different beds between hotels, hospitable farmers and fellow Nuffield Farming Scholars.
Drove 9 hire cars for a total of 15,800 miles.
Undertook 70 separate meetings.
Met individuals - from small scale beef and dairy farmers through to multinational companies.

Figure 4: What a Nuffield Farming Scholarship looks like



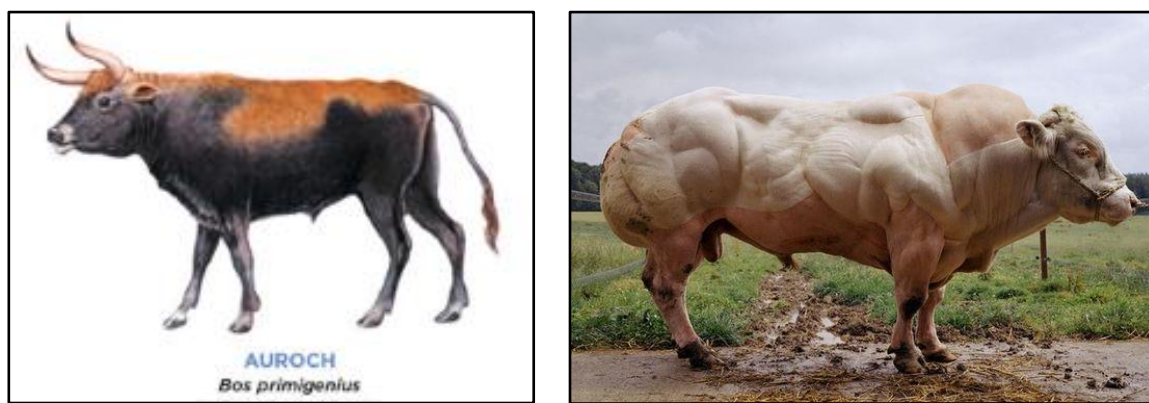
Countries visited by author during study tour showing their respective beef production according to FAO 2014 data in million tonnes			
Country	Date and period	Notes	Beef production 2014
Estonia	March 2014 One week	Small country previously part of USSR and intensive producer of pig and poultry. Low consumer of beef but >70kg of meat per capita. Attended “Estonian Precision Farming Conference” and visited several dairy and beef producers.	0.01 million tonnes
Unites States	July 2014 Three weeks	Globally the largest single producer of beef. Increasing population demanding sustainable and high quality beef from declining beef herd. Attended “American Academy of Beef Consultants” conference, visited several dairy and beef producers plus integrated companies in Nebraska, Colorado, Iowa, Minnesota, Michigan, Indiana, Idaho, Illinois.	11.08
United Kingdom	Various One week	How do various dairy and beef producers plus retailers, processors and businesses approach the issue of demand from consumers with matching expectations of the market?	0.88
Australia	February 2015 Two weeks	With 2.3 million dairy cows and an export-driven market, what does Australia do with its dairy-bred bull calves? It is a global exporter of quality suckler beef, plus live export to several countries. How do the retailers in Australia see beef? Visited several dairy and beef producers in Victoria, plus integrated companies from other sectors of food industry.	2.60
New Zealand	March 2015 Two weeks	With 6 million dairy cows and an export-driven market what does New Zealand do with its dairy-bred bull calves? 70% of NZ beef comes from the dairy herd: is there any demand for integration of dairy-bred beef? Visited several dairy and beef producers in North Island plus integrated companies from other sectors of food industry.	0.69
Canada	April 2015 One week	A visit to British Columbia to meet dairy farmers involved in expanding within a quota system where all beef has increased in value due to export demand. Met with a genomics expert looking at managing herd production against minimising disease.	1.08
Ireland	May 2015 One week	By size one of the largest exporters of beef but, with pressure to develop dairy, the beef herd is declining and beef production falling. How do farmers see dairy beef evolving when small farms producing single suckled beef from grazing is the tradition? Met with integrated producers of beef, chicken and processors alongside geneticists and researchers.	0.58



5.0. Farming for meat

Since early civilisation, as our hunter gatherer ancestors moved from roaming to settled communities, food production became important to sustain the *populi*. Archaeological evidence suggests at around 8,000 BC the domestication process for the aurochs (*Bos primigenius*) began.

A combination of the Latin noun *firma*, meaning a fixed agreement or contract, and the adjective *firmus*, meaning strong and firm, produced the word *farm*: with its background coming from the mediaeval age where a contract was struck between landlord and peasant to manage the land for production for the long term.



Figures 5 and 6: Cattle have been bred and selected for meat over the last 10,000 years - from domestication of the Wild Auroch (left) to the Belgian Blue (right)
(Source: Stanford Magazine online and Facebook.com)

Two branches of all farmed beef cattle can be traced back to the wild auroch: *Bos taurus* and *Bos indicus*. Slow gains in historical meat and milk yield were seen until the 1700s, when the *Agrarian Revolution* saw beef production start to be targeted by farmers. By using genetic selection, a move towards more specialised dairy and beef breeding lines allowed for gains in production from each branch of cattle in their respective regions. Although some breeds are still recognised as dual purpose, demand for food, a growing population and increasing wealth after World War II have meant ever more dedicated breeding and production methods have been developed.

A growing middle class demands more meat- and milk-based protein, as well as choice. Poultry and pig meat production has developed to match this demand. Large businesses have been born out of the opportunity, scale and industrialisation that pig and chicken meat offered. Since the 1930s food service companies have developed to manage the supply chain, linking farming practices and food production to create integrated models. This new style, industrial farming, was helped by the *Green Revolution* with cheap, concentrated feedstuffs readily available and traded across the world. Cheaper and more reliable feedstuffs allowed for rapid expansion of the new, intensive meat production system where time means money.



6.0. Current UK beef production

Demand for beef is growing globally. Current world consumption is 10.1kg *per capita*, and increasing steadily. Much of the increase is driven by a global expansion of the middle class as world population grows, and the people become more affluent in developing countries such as Indonesia. Even at 2014 consumption levels, as global population expands to the predicted 9 billion of 2050, this means farmers will have to produce 42% more beef, despite pressure on land and resource that could restrict breeding cow numbers.

Where will our beef come from?



Figure 7: Is this how the consumer perceives UK beef production?
All these growing cattle are dairy bred and will be intensively finished after grazing through the summer

There are several areas I feel need addressing if UK beef production is to continue, even flourish, into the future. There are questions being asked by consumers, retailers and NGOs that challenge, or could challenge, the UK beef farmer's right to produce:

- Food security: the UK beef herd is declining – where does current UK beef come from? What can we do to produce beef animals in the future if we are to minimise dependency on imports to ensure we can feed our population?
- What is the long term sustainability of beef production?
- Where is the consistency in beef that is seen in chicken and pork?
- How can beef beat food inflation? Can beef be affordable or will it become a luxury product?



- Traceability following the food scares of BSE and “horsegate”: how can the beef supply chain demonstrate that production is secure?
- Why should we trust the welfare and assurance of UK beef production?
- Should we ethically be eating beef?

Integration in the poultry, and to a lesser extent, pig and even fish meat industries has allowed greater food security. At the same time, these industries have also drawn criticism with regards to many of the questions above. To answer their critics, and profit from the ensuing demand, producers and retailers have differentiated the market: now the consumer has a choice where their meat comes from - such as intensive or free range organic chicken, indoor or outdoor reared and finished pork, rare breed bacon, even farmed versus wild-caught salmon. The opportunity to differentiate within the UK beef supply chain, following the examples of other meats, has been relatively passed over even though this could offer value to the industry.

6.1. Meat production – development and recent history

*Since the BSE crisis of 1996, and the Foot and Mouth outbreak in 2001 there has been a decrease in the national herd.
This must be impacting on beef production?*

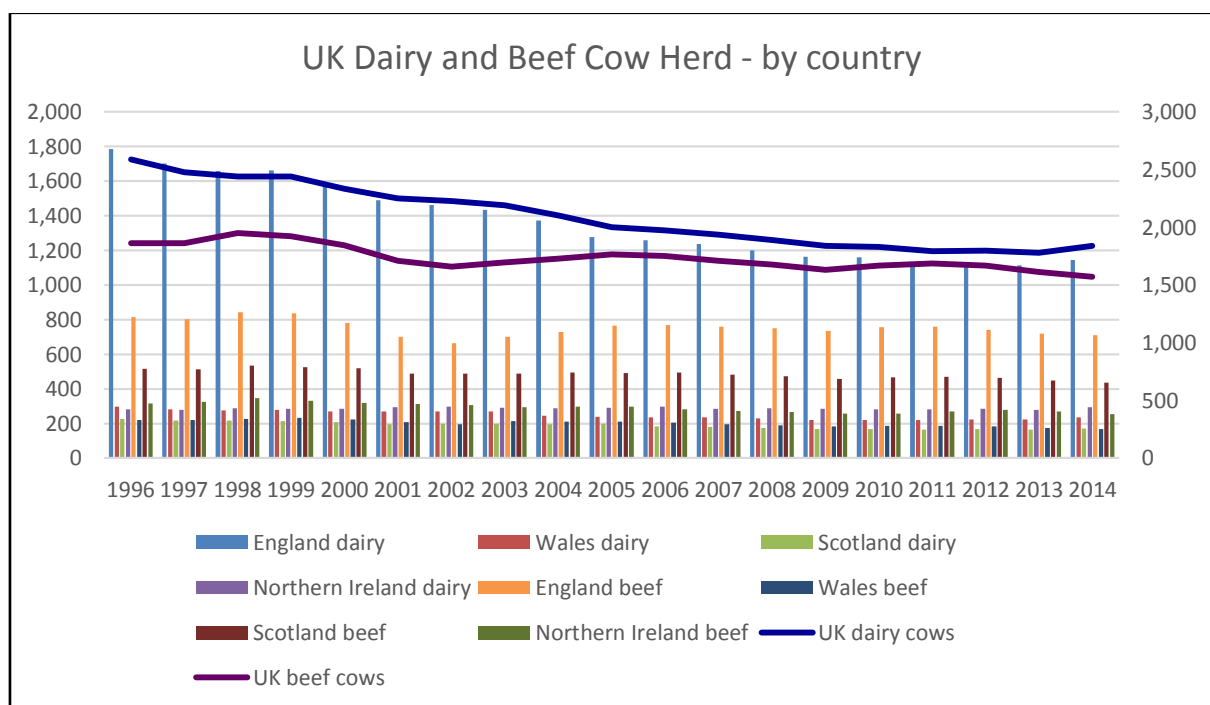


Figure 8: Chart of UK beef and dairy herds by country and totals since 1996
Figures shown on the vertical axes represent thousands of head.
(AHDB data extracted by the author)



As figure 7 above shows, there has been a decline in the national cow herd from 4,452,000 to 3,411,000, losing 23.4% or 1,041,000 cows. Beef cow numbers dropped to 1,570,000 (271,000 cows or 14.7%) compared to a loss of 724,000 (27.9%) in dairy cows, leaving 1,841,000. In the same period beef and veal meat production actually increased from 688,000 to 878,000 tonnes from a similar number slaughtered.

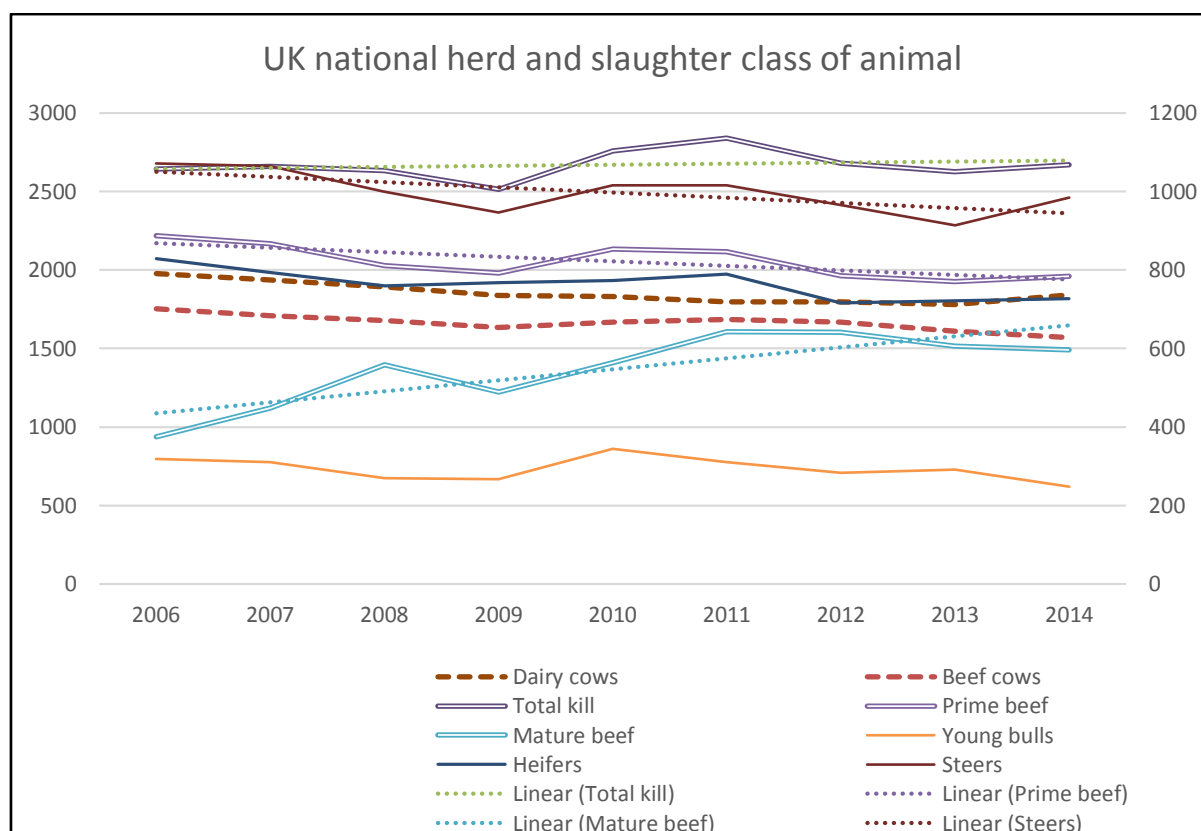


Figure 9: The UK beef and dairy herd compared to slaughtering by class of animal since 2006
The figures down the right and left hand sides of the graph indicate thousands of head

In 2014, 2,664,000 head were slaughtered in the UK. Figure 6 above shows the trend in the slaughtering numbers of prime (steers, young bulls and heifers) against mature (older bulls and cows) for the UK, plus calves. This suggests the average carcass weight increased: but by how much and why?

Looking at carcass weight the meat yield has increased considerably when following beef production against slaughtering across all animals slaughtered: a gain of 75kg or 29.5% more meat per head slaughtered between 1996 and 2014, according to AHDB Beef & Lamb data. The average carcass was 329kg in 2014.

AHDB data also shows considerably more calves have been slaughtered for veal production. This class of animal is almost entirely dairy-bred with specific schemes for white and rose veal now accounting for a larger number of animals processed.



Analysis of DEFRA, FAO and AHDB data suggests between 1995 and 2014 the:

1. National herd (dairy and beef cows) contracted by 23.4%
2. Total weight produced has declined but by less than the decline in number slaughtered
3. Total head slaughtered of prime animals has declined by 11.6%
4. Total head slaughtered of mature animals has increased by 59.2%
5. Average carcass weight is up 29.5kg to 329kg per head slaughtered.

6.2. How much beef could the UK produce?

Figure 9 below shows the basic, and admittedly simple, calculations that one can work through to predict potential beef numbers. Using cow numbers, the number of calves born can be calculated and, from there, replacement heifers and prime beef. There have been various assumptions through the process, with overall losses between birth and slaughter of 14-15% of animals born: research published by AHDB from 2011 by *Brickell et al* showed this to be average. Although the level of mortality and wastage through the system could be seen as unreasonable by many farmers, from my own experience this would be average on many units, dairy and beef!

	Assump- tions	1,000 of head			Notes
		Beef	Dairy	Totals	
Cows		1,570.00	1,841.00	3,411	From AHDB data
Calving cows	80%	1,256.00	1,472.80		Recalving 80% of herd
Heifers dairy	30%		552.30	552	Average replacement rate
Heifers beef	20%	314.00		314	Average replacement rate
Animals bred		1,570.00	2,025.10	4,277	From all breeding females
Calves born	100%	1,570.00	2,025.10	3,595	If all cows calved annually
Calves weaned	8%	1,444.40	1,863.09	3,307	Losses to weaning
Yearlings	5%	1,372.18	1,769.94	3,142	Losses to 12 months
Total heifers	50%	686.09	884.97	1,571	Half of all calves born
Non breeding		372.09	332.67		Not retained = beef calves
Heifers retained	1%	679.23	876.12	1,555	Kept back for replacements
Barren beef	10%	67.92	87.61	156	Failure to conceive heifers
Beef females	1%	368.37	329.34		Losses 12 to 24 months
Beef males	50%	758.31	978.12	1,736	Half of all calves weaned
Beef	1%	750.73	968.34	1,719	Losses 12 to 24 months
TOTAL FOR PRIME BEEF		1,187.02	1,385.30	2,572	Total animals available for beef production

Figure 10: Example of basic calculations for beef calf annual beef production from UK national herd
(Author's own calculations using AHDB data and current best practice information)



The 2014 UK prime beef slaughtering was 1,959,000 head – steers, heifers and young bulls. Using the calculations in the Figure 9 chart above it would not be unreasonable to see more than 2,500,000 head available for beef. Subtract from this bobby calves such as Channel Island pure bull calves, on-farm disposal due to TB and other disease risks, plus those numbers for veal, and a shortfall of 250,000 head or more could be argued as lost from potential beef production could feasibly be said to be lost from current UK beef production.

Looking at the national herd – an increase in the number of beef cows would be possible. However, to expand single suckled beef production there would be a time lag of at least 3 years plus decreased slaughtering in the same period, as heifers destined for meat are taken out to become new breeding animals. From then a further 12-24 months would be needed, as the new beef calves born need to be raised and finished. Expanding the beef herd would also mean significant investment in infrastructure requiring returns to match.

Increasing dairy-bred animals destined for beef could offer a more rapid growth in production. Would these animals be the right ones for the UK meat market? Or is the UK meat market right for dairy-bred animals? Is it possible to produce the correct animals for the UK beef market?



7.0. Is there demand for more UK-produced beef?

A question with a complex answer – as beef production is as much about farm gate price as it is about demand from the consumer.

UK beef consumption for 2015 is predicted at 1.1 million tonnes, against national production of 878,000 tonnes. The country is 76.5% self-sufficient for beef, meaning an additional 222,000 tonnes are required through imports. This would suggest demand exists for more home produced beef, especially when the beef exports (some 12% of production) mean further nett imports to offset these. Growing domestic production should be possible, but by how much?

To simply achieve food security for beef the UK would need to slaughter an additional 674,000 head at the 329kg current average carcass weight. Taking the previous table (Figure 9) for beef animals born annually, to reach 100% security would require substantially more than could be calved to the current dairy and beef herds at zero calf mortality, zero wastage and 100% fertility when adding herd replacements to the total.

Table 11 on the next page shows: Retail sales in Great Britain by volume of meats 1995 to 2014

NGOs such as Compassion in World Farming, the RSPCA and even our own levy board AHDB - Beef & Lamb - cite farm assurance, traceability and sustainability as key drivers when the public buys beef. UK beef does have great levels of assurance – but does that make our beef better than many other imported sources? Whilst, as a farm vet, it would be great to know these NGOs are correct, analysis of sales and decision-making data does make these assumptions difficult to believe:

- Changes in buying practices towards discount retailers (+31% growth of discount retailer market share of beef volumes in 2015) against the major retailers (-8% by volume) and independent butchers (-11%) suggests price is one of the main drivers in purchasing. Most of this growth has been from “thin cut” steaks and mince at discount level.
- 50% of all sales by volume is mince against 15% steaks/frying beef. Convenience and value again would be significant drivers, when looking at value of the same two categories of beef as 35% vs 26% respectively.
- Some 75% of all beef consumed “out of home” is imported. Rarely is the provenance or level of welfare assurance noted by a restaurant or food service provider. Only 14% of beef consumed “in home” is imported.

See charts on next page

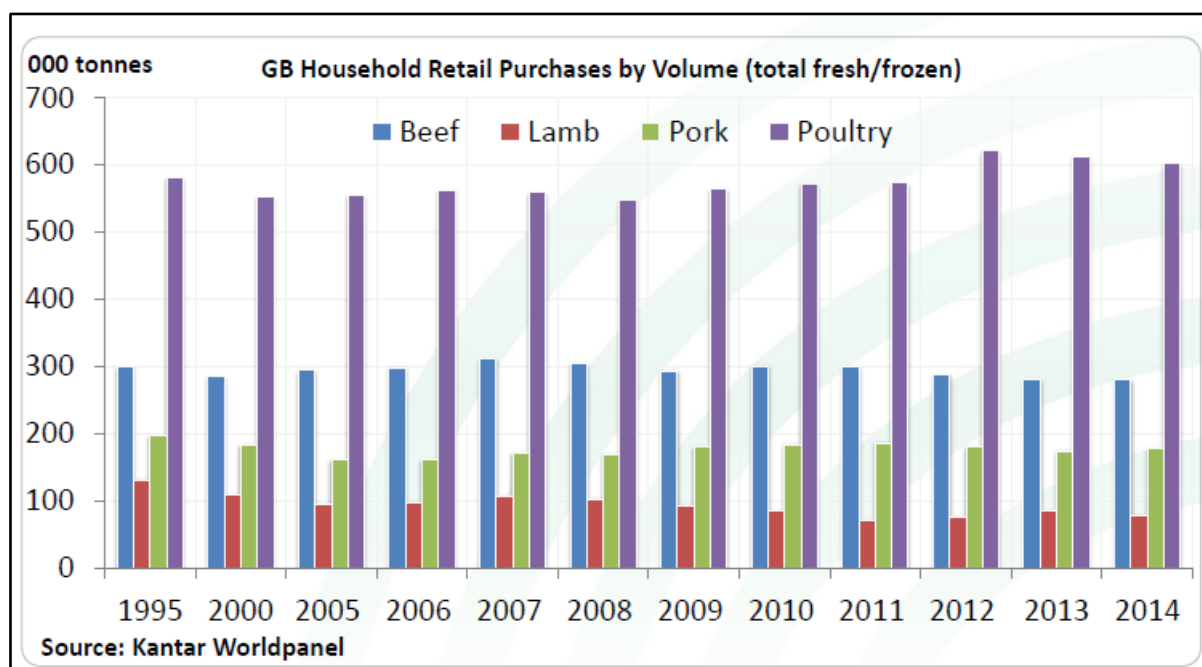


Figure 11: Retail sales in Great Britain by volume of meats 1995 to 2014
(Source: Kantar Worldpanel)

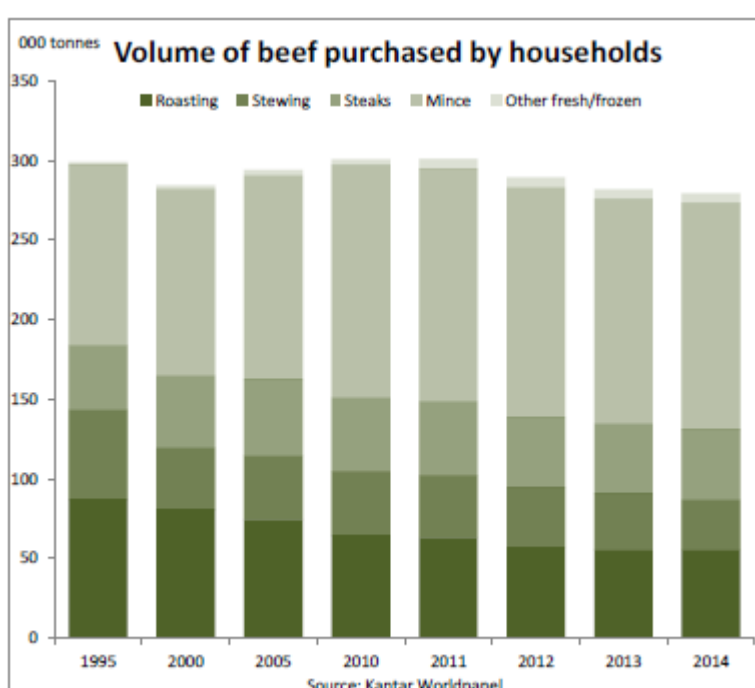


Figure 12: Volume household sales of beef by type 1995 to 2014
(Source: Kantar Worldpanel)

Farm assurance and traceability may make good reading for the public. Yes, the more discerning consumer would accept paying more for British beef with its attached levels of welfare and assurance but do they understand what that really means? Despite “horsegate” and other recent food safety issues, it is the purse of the consumer that makes the ultimate decision for the majority. Beef sales by volume increased 1.2% in the 52 weeks to June 2015; however, the value of those sales only rose by 0.6% - suggesting sales are more related to value than quality of cut?

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale
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In a situation of low supply and high demand, the laws of economics should see the price of beef move upwards, even were it treated as a simple commodity in the UK. Being a globally produced and traded product, imports have the potential to offset significant price pressure at the farm gate, and then ultimately to the consumer. Managing the price of beef to the farmer, many would argue, has been skilfully managed by importing cheaper product. Have processors and retailers maintained margin for themselves in beef, despite inflation, by using the availability of cheap imports to subdue the farm gate price? Again that would be simplistic as other meats have also grown in consumption in the past 20 years, depressing demand and price of beef: household consumption of chicken was more than 600,000 tonnes against 300,000 tonnes of beef carcass weight in 2014.

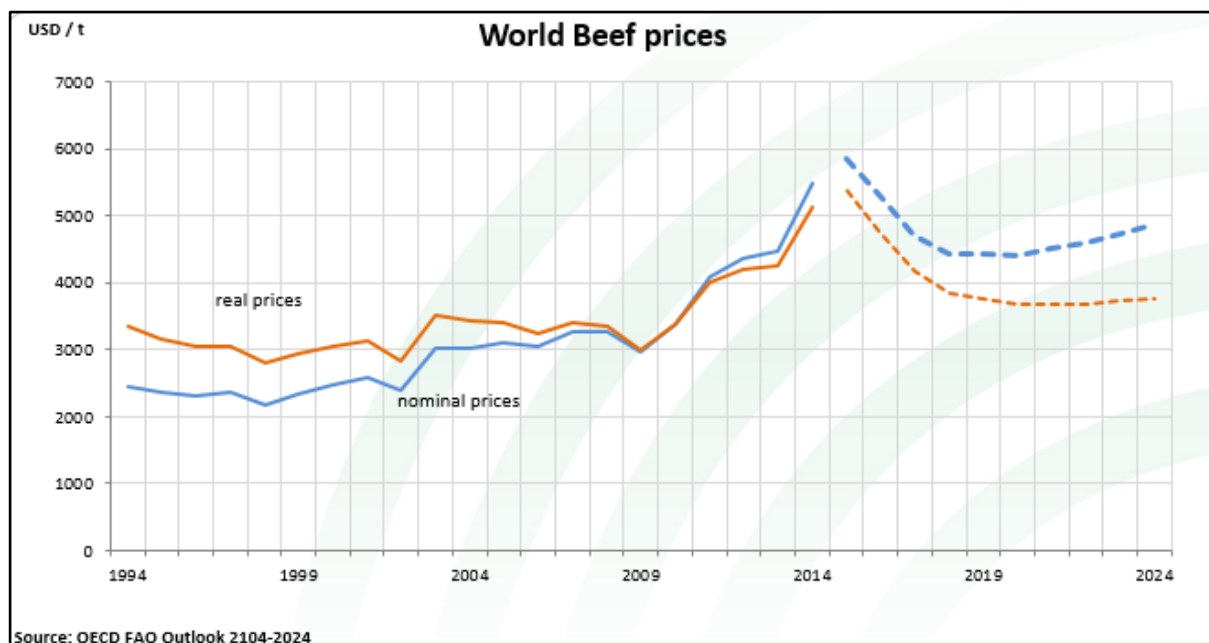


Figure 13: The world beef price trend and future prediction from FAO
(Source: OECD FAO World Outlook to 2024)

Quite simply beef is a global product: with trade keeping national prices within a reasonable global model. We have scope to increase UK production: as global demand rises, market forces will impact the ability of the processors and retailers to import cheap beef though price pressure could reduce sales. This changing marketplace could be of interest to the pig and poultry integrators where scale and consistency will count – could beef, though, truly be integrated in the same way as these other meats?

Therefore any increased production needs to come from a reliable and efficient model to offer scale against supply and consumer pressures. We can produce more beef in the UK – but only dairy beef offers a readily scalable model for near future expansion.

Again, though, the question remains: is dairy beef going to be the right solution?



8.0. What is integration?

“Uniting in one system several constituents previously regarded as separate”

Oxford English Dictionary

To understand if integration could work in the UK beef supply chain, it is important to define what the word really means.

Integration is the bringing together of processes to form one managed production system that allows both better management and efficiency streamlining production to improve margins. There are two main categories for integration: vertical and horizontal.

Horizontal integration is the acquisition of additional business activities that are at the same level of the value chain, in similar or different industries. This can be achieved by internal or external expansion. This acquisition would reduce production costs by sharing resources at the same level across various supply chains. If the products offered by the companies are the same or similar, this could be seen as a merger of competitors, producing a monopoly in that sector. (<https://ccit300.wikispaces.com/Horizontal+Integration>)

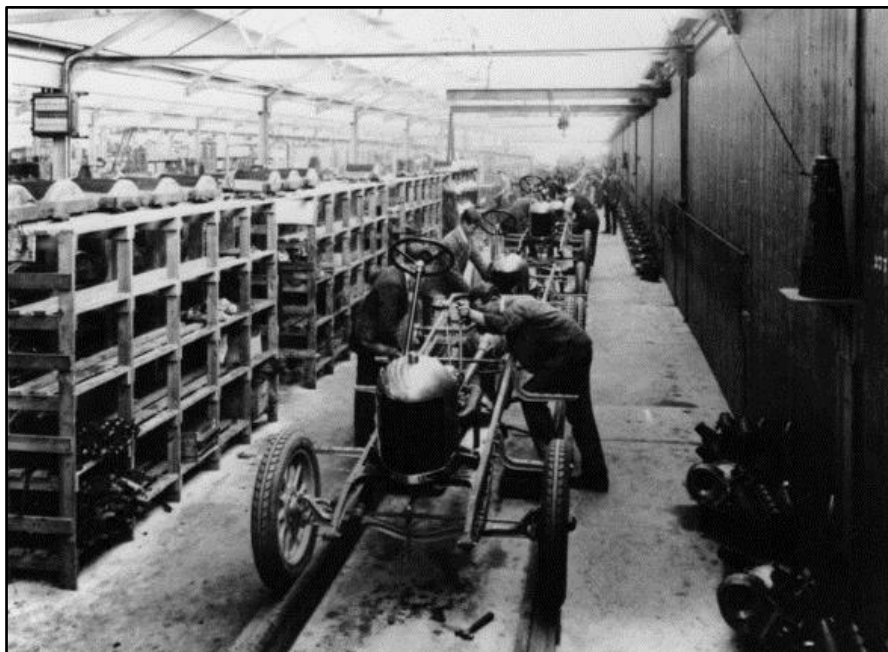


Figure 14: Morris car works: an example of integration from Lord Nuffield himself
(Source: Built in Oxford – news on AOL.com)

Vertical integration is an arrangement in which the supply chain of a company, or production process, is managed towards a common output. Usually each member of the supply chain produces a different part or section of the final product, with the parts coming together to satisfy a common need. There are three typical models of vertical integration:

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- **Backward Vertical Integration** – where a company controls subsidiaries that produce inputs used in the production of its products.
- **Forward Vertical Integration** – where a company controls distribution centres, branding, marketing and even the retailers where its products are sold.
- **Balanced Vertical Integration** – is complete management and control (up and downstream) by a company from production to sales of a product.

8.1. Integration practices

Vertical integration is recognisable in large scale, agribusinesses such as Danish Crown (Tulip in the UK) or Perdue Chicken in the USA. Bringing together farming practices to streamline production takes a level of management beyond most small, family businesses – when combining the processes from sourcing raw materials such as feed or seed, through farming, then on to marketing and branding. Integration can be an expensive exercise.



Figure 15: Perdue Chicken of Maryland, USA have been integrating since the 1930s
(Source: Perdue.com)

Family farms more often enter small scale, or short chain, models of integration. These short chain models commonly involve other small businesses working to add value to their product. Various examples of short chain integration were seen on my travels, and these usually had one farmer with an entrepreneurial drive taking control of a group of farms to integrate and gain value through working forwards with branding and retail schemes.

Strategy and forward planning are key to making an integrated business succeed. A whole industry of advisors and consultants has developed around the integration in mainstream industries such as car manufacturing: whilst, in farming, implementing change has often been more difficult to manage unless by merger and acquisition. The process from small scale, family enterprise to large scale, agribusiness can be costly and time consuming: support is needed to guide farmers through the changes as integration takes place.

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Integrated business planning (IBP) is a recognised field in modern industry. IBP is defined as the process of using advisors, technologies and applications to take the initial business model through to implementation and end goals that sees an enterprise or organisation maximising its financial performance. Following a SiMPLE (Smart Integrated Market-driven Planning & Execution) plan, IBP works to allow a business to develop integration with a targeted approach including strategic, operational and financial planning.

Integrated Farming

A modern farming practice where sustainability is seen as the key outcome of integration: linking land use to production through a holistic approach could be seen as integration at the base level of the ecosystem. The International Organisation of Biological Control (IOBC) defines *Integrated Farming* as “a farming system where high quality food is produced using resources such as soil, water and air, plus regulating external factors, to farm sustainably with as few polluting inputs or outputs as possible. This requires a holistic approach through linking processes with supply and production aims, allowing for sustainable intensification within the farming chain.”

The input per kg of output and the output achieved per hectare of land utilised – a limiting resource as global population grows – are decisive figures for evaluating efficiency and the environmental impact of any agricultural system. Using parameters to monitor production and efficiency – by key performance indicators – will allow agricultural systems to be compared and then monitored for change management in the future. Integrated Farming is perhaps one area where beef production could be linked with arable and other farming operations for the benefit of the ecosystem?

8.2. Pros and cons of integration

Scale in any business allows for data collection and meaningful analysis. Economies of scale through integration often mean levels of management can be introduced to oversee the supply chain, with added benefits often in the areas of efficiency and cost of production alongside career progression that would be unheard of on many farms. *(continued on next page)*

Why do integrated businesses fail?

- When transactions are deemed too risky to undertake. Whilst small scale, or entrepreneur-led, businesses would see the potential for gain, integration usually involves additional layers of management that can make the business slow to adapt and change. Innovation can be slow to develop in an integrated business.
- The contracts to support production can become too costly to administer in a multi-layered business. Adding in levels of management add cost, meaning a high unit cost before the streamlining and scale of integration impacts production.
- Integration within a small market place: when the integrated business becomes so large compared to the volume of its sales, with a small number of buyer and sellers, leading to a relatively high cost of production versus return.



(continued from previous page). However, scale also often means cost in management and a low level of flexibility in the supply chain - affecting the business when trends change, or in times of economic downturn.

Society can gain or lose through vertical integration. These losses can be internal, affecting the industry, and external to the greater public and environment. The impact depends very much on the level of technology in the industry being integrated.

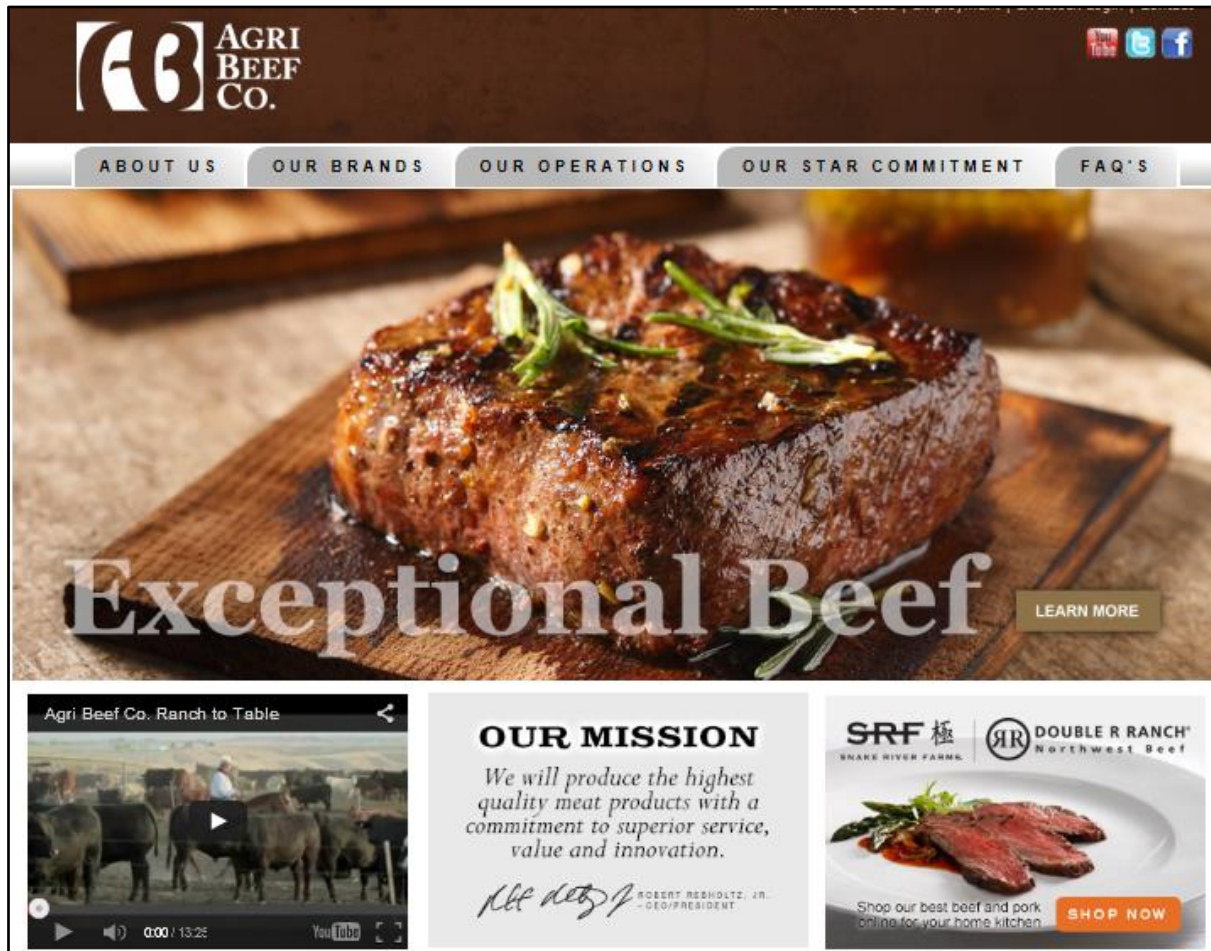


Figure 16: Agrib Beef (operating in the USA) started in the 1960s as a family ranching business. It is now fully integrated, from feed supply to branded beef sales: growing, slaughtering and marketing some 500,000 head each year. (Source: Agrib Beef.com)

Many types of farming beyond those of pig and poultry could, feasibly, be vertically integrated. As I travelled, I became more aware of the range of integrated business possibilities: from arable and vegetables through to suckled beef and lamb there were producers who had seen the benefits of having some level of supply chain integration.

Are improved returns on production and business value the main gains through becoming integrated? How else does the business gain? What of the impacts beyond the farm: are their social and economic benefits for the area when a supply chain or farming business becomes integrated?



Business gains – what does the act of integration offer to a business?

- Lower transaction costs – the supply chain works together to reduce overhead.
- Synchronisation of supply and demand along the chain of products – streamlined supply.
- Lower uncertainty and higher investment – banks and institutional investors see businesses involved in an integrated supply chain as lower risk.
- Ability to monopolise market through the chain by market foreclosure – sales are maximised.
- Strategic independence within supply chain (especially if important inputs are rare or highly volatile in price).

Internal losses – how does integration impact the business?

- Higher coordination costs – more layers and higher management costs.
- Higher monetary and organisational costs of switching to other suppliers/buyers.
- Weaker motivation for good performance at the start of the supply chain since sales are guaranteed and poor quality may be blended into other inputs at later manufacturing stages.

Benefits to society – how does a business or supply chain becoming integrated impact society?

- Better opportunities for investment growth through reduced uncertainty.
- Local companies are often better positioned against foreign competition.
- Job security for workers – more robust business as returns maximised.
- Career progression – chance for workers to move up and gain more return for labours plus job satisfaction within tiered management and through larger supply chain.
- Learning and continued development – larger structure of integrated business can allow staff learning opportunities.

(https://en.wikipedia.org/wiki/Vertical_integration)

Losses to society – are there negative affects to society as a whole caused by integration?

- Monopolisation of markets – price controls and potential higher costs.
- Lack of innovation – reduces choice to the consumer.
- Rigid organisational structure – become stressful for staff and potential for impact on families.
- Rigid management practices – suppress individuals and reduce opportunities to develop.
- Large businesses employing large numbers of people can move processes and suppliers or even fail – lost employment through large swathes of an area.

In my travels it was important to see how integrated farming businesses had developed. What are the processes involved to make a business move from a straightforward, simple, farming enterprise to an integrated model? Integration usually brings size and scale leading towards a bigger business unit – what were the drivers that made a farmer want to change? It was also important to meet with farmers and businesses that had decided not to become integrated or to be involved in beef production from dairy youngstock.



9.0. Integration – is it possible to compare beef to chicken?

“Can we chickenise beef production?”

Efficiency of production of our three main farmed meat species has improved in the past 50 years. However, beef production has not improved to the same extent. Why?

Beef production is measured in years, compared to days or weeks for poultry or pig meat: the protracted time from birth to sexual maturity, the length of the reproductive cycle and the age at slaughter all mean genetic gain has, until recently, been relatively slow. Gains have only been possible through phenotypic evaluation of the offspring: the time from selection of breeding stock to finished offspring and meat. All this has meant progress in beef genetics has been relatively pedestrian compared to the equivalent advances in chicken.

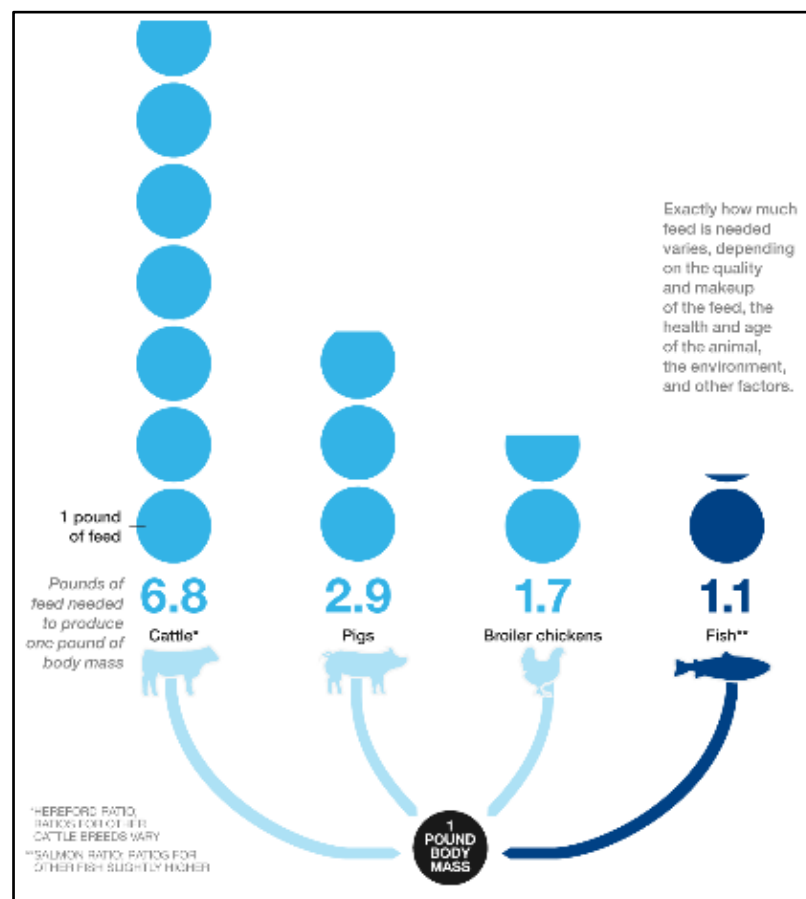


Figure 17 : potential best practice FCE (Feed Conversion Efficiency) across farmed species
(Source: National Geographic.com)

Using hybridisation allows chicken and pork integrators to maximise efficiency

Hybridisation, especially in chicken, has resulted in supply chains where the initial breeder is integral to the final production of meat. The breeder has the task of producing stock with genetics reflecting the aims of the business – even to the point now where a chicken hybrid can be selected for age at slaughter against weight depending on the finishing system the chick is destined for: such as free range versus intensive broiler birds, or meat texture.

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Pig multipliers supply large numbers of young breeding gilts to allow farrowing units to then breed to specific boars for weaners that can be matched again to the market supply contract the finished pigs are destined for. Semen selection for breeding lines, and then using terminal sires, produces different hybrid lines according to selection criteria: i.e. number of piglets, weaning weight, finishing time, meat yield or even for a dedicated retailer scheme such as Gloucester Old Spot. Often hybrid boars have been used for these phenotypic production strains.

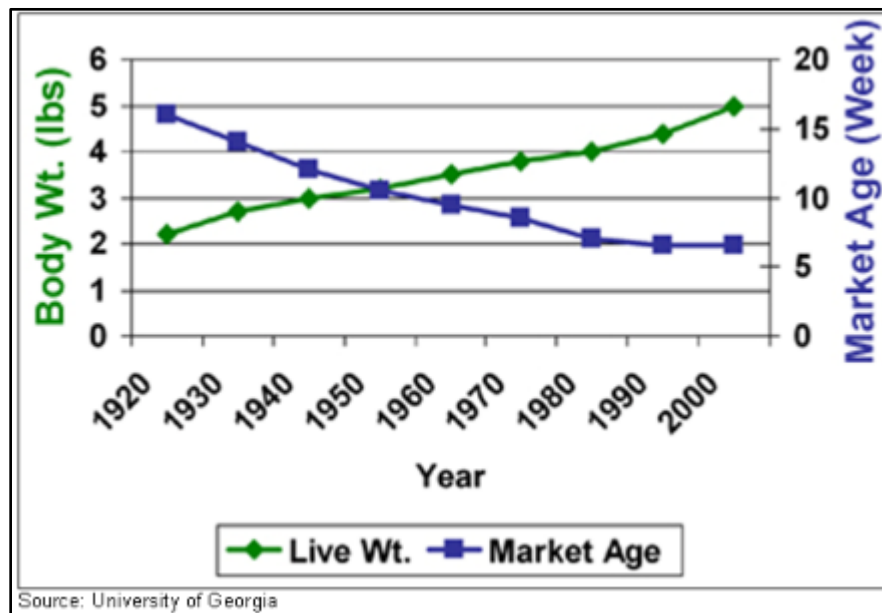


Figure 18: How hybridisation and integrated production changed US chicken weight for age (Source: University of Georgia)

Effectively a hybrid strain can be selected, passed to the multiplier/hatchery, and then be producing meat in a short time within an integrated chicken supply chain. At the hatchery laying hens are mated to create the hybrid of choice, and egg production begins to quickly replicate that gene line. Hatcheries produce day old chicks, often measured in thousands or more on a daily basis, to supply finishing units where the aim is production unit costs per chicken place. A shed can be filled in a single day by, effectively, clones of the same hybrid line.

See example on next page of hybridisation in Tegel broiler chicken for feed conversion against 37-day weight by strain.

The reproduction to maturation cycles in poultry and pigs are relatively short allowing rapid gains in the productivity of these species. Through dedicated breeding and selection programmes, agribusinesses have hybridised poultry and pigs. By selecting gene lines, selected for the traits required - such as meat yield, quicker maturation or improved feed conversion efficiency - the integrators' industrial approach to production has effectively taken these proteins from higher cost systems to consistently affordable, plentiful meat for the masses.



Figure 19: Long term changes with hybrid strains of Tegel broiler chickens to 37 days, weight and feed conversion
(Source: Tegel Chicken archives)

9.1. Phenotypical breeding

Selection of beef genetics has been based on physical (phenotypic) outcomes until very recently using experience of the breeder/farmer and the knowledge of the stock being bred: taking this one step further with the founding of breed plan analysis to compare one animal/its offspring with others of the same breed.

This was the beginning of a reliable index for phenotypic traits. The overall analyses of traits that can be measured takes time and large numbers of animals for comparison. The reliability of the index is based on the number of offspring/animals to be compared, the quality of the data such as parentage, date of birth and the repeatability of the measurement used. EBVs are therefore based on solid, physical data – they do not reflect temperament or other less easily measured parameters.

In the UK the creation of EBVs (Estimated Breeding Values) revolutionised beef breeding programmes: EBVs for pedigree (full blood) stock have become the norm when farmers are looking to breed for production or manipulate their stock characteristics. EBVs have allowed comparative selection when breeding with parameters measured against a genetic base for that breed. *(See further details of Estimated Breeding Values in text box on next page).*

To see any significant gain, the breeder has to take the reliability of the index being compared with the stock on their own farm. There is still, therefore, an element of chance in using purely EBVs for breeding decisions, even when breeding purebred animals – as the population size, genetic variation and environment can all impact the outcome. Chance still can have a high impact on bovine breeding decisions.

Adding to the variability of the outcome, the time from breeding to final measurement of any paired mating results is still massively protracted in cattle compared to pigs and poultry. The rate of any meaningful gain purely based on phenotypic expression will take years.



Estimated Breeding Values: reflect the various physical traits measured in offspring such as calving ease and weight gain. EBVs are produced for bulls using analysis of simple-to-measure recorded data from monitored farms. The more animals measured the more reliable the EBV; however, this often is impacted by rate of production of good numbers of offspring for these bulls. Therefore to have a reliable EBV time and money are required. Examples of EBV include:

- Gestation length = reflects on calving ease
- Birth weight = reflects on calving ease and then weight gains
- Calving ease direct = comparing bull impact on calving in purebred 2 year old heifers
- Calving ease daughters = comparing daughter calving ease in purebred 2 year old heifers
- 200, 400, 600 day weights = weights adjusted for number days to look at liveweight gain
- Carcass weight = at standard 650 days, or vary according to breed
- Eye muscle area = muscling in live, 300kg carcass equivalent animal
- Retail beef yield = meat yield at 300kg carcass
- Intramuscular fat = marbling at 12/13th rib site at 300kg carcass

9.2. Speeding up gains in beef genetics – where next?

Improving cattle performance across a herd has been a lifetime project for a beef farmer. Recent developments have allowed acceleration of the process of genetic gain above phenotypical expression. This process has required an understanding of the bovine genome, selecting specific genes for gains such as beef yield or health then breeding for animals carrying those genes. To understand how we can speed up gains in beef it is important to have a basic understanding of genetics:

1. **Gene** is a segment of DNA, occupying a specific place on a chromosome, representing the basic unit of heredity. Genes act by directing the synthesis of proteins, which are the main components of cells and are the catalysts of all cellular processes. Physical traits, such as the shape of a plant leaf, the colouration of an animal's coat or the length of a cow's horns could grow to, are all determined by genes.
2. **Genome** is the total amount of genetic information in the chromosomes of an organism, including its genes and DNA sequences. The genome of an individual is contained in the nucleus of every cell. All cells contain two copies of the chromosomes, except those involved in reproduction. The genome is passed on to offspring by splitting the chromosomes to form single sets of genes that are then joined to form the new individual when the male and female reproductive cells join. Cattle have about 22,000 genes (14,000 of which are common to all mammals) located on 60 chromosomes. Genome was first recognised as a word in 1926.
3. **Genomics** is the science of DNA analysis (genomics) for particular identified markers. The key [DNA](#) differences, known as [haplotypes](#), between several breeds of cattle are now being identified and charted. Being able to identify, on the genome, the presence or not, of particular genes can then allow scientists to understand what is their role when coding for products of economic value such as milk and meat. Genomics was first recognised as a term in 1984.



The science of genomics is opening new perspectives for enhancing [selective breeding](#), allowing a more rapid change in cattle characteristics for the benefit of the farmer and then the consumer. Selecting breeding lines that have the addition of, or the lack of, certain genes then can influence outcomes at a genetic level long before phenotypic comparisons could be made.

Genomics is already changing breeding in the dairy industry: more rapid gains are expected in dairy health and production in the next 10 years than in the last 100, with genetic selection based on marker checks for gene expression such as udder health, lameness etc. Using genomic markers will speed up the evaluation process for beef breeding lines – with health traits, meat yield and feed conversion efficiency the main targets. Genomics allow for predictive breeding.

“Animal genomics is vital in feeding an expanding world population while minimising environmental and ecological risks. Clearly, the identification of variation in livestock genomes that predisposes health and productivity with less reliance on hormones, antibiotics, and pesticides will be a major step in meeting this global challenge”.

James Womack, Centre Animal Biotechnology, Texas A&M University

The markers and reliability of identification of specific genes (from a base of 22,000 overall) will rely on test population size for comparison. To ensure genomic tests for beef have a high predictive value will ultimately require investment in testing the base population in the UK as currently the main testing laboratories operate schemes for Aberdeen Angus in the USA and Wagyu globally. As one of these labs is operated by a multinational pharmaceutical company (Zoetis) this suggests the commercial viability to improve production and health in beef via genetic selection has been recognised.

The GeneMax (GMX) genomic testing panel in the US is marketed, and supported, by the Certified Angus Beef LLC. After initial slow uptake the GMX is now being commercially used to improve both production and health traits.

A 2013 study followed 80 x single sourced Aberdeen Angus bred steers through finishing to processing. The steers were kept as a single group on the same feedlot with same diet and overall management. Results: the split between the top (average 89.5/100 score on GMX panel for CAB classification) and the bottom grouping (average 50.7/100) was considerable for carcass scores: 50% vs 32% top graded beef.

Utilising the current, commercially available genomic panel to select a new beef bull prior to working, has been likened to following between 8 and 20 progeny through from the same bull for phenotypic evaluation. Genomics clearly offers a more rapid advance in selecting beef production traits.



10.0. It's not just white meats that have been integrated in farming

From the early developments of integration, the aim has always been to streamline production through to a finished product for sale, with the economies that integrated management and manufacturing should bring. Through my travels it became apparent that many types of farming lend themselves to integration.

What drives integration in farming is really no different from that of the motoring, or other industries: it is often the need to beat market forces for supply and to improve margins.



Figure 20: Moy Park Chicken, now part of the JBS group of companies, began in the 1960s as a collaboration of farmers to produce chicken in Northern Ireland.

Trust – develops from small scale collaboration through to integration

Farmers are notorious for wanting to work by themselves. Social scientists would have many reasons for why farmers are so independent, but from my experience, this is most common in the UK due to perceived local competition for land and stock sales, cultivating a lack of trust between local producers in a very tight marketplace.

The unwilling nature of many farmers to work together not only confounds the process of integration, it also means the ability to benefit from collaboration, such as the simple act of sharing machinery or expertise, is stifled. Taking cost from the supply chain would be one key aim for integration in other industries – and with some time and the influence of good advisors, I have seen some levels of integration develop, even if the farmers involved are not conscious the process is happening!

Marketing their produce is often the last reason why one farmer would want to work with another. However, when farmers are able to see beyond their own farms, and production, to the potential to



gain through better selling prices by working together, then some are willing to then make the “leap of trust” and start to integrate. Benefiting from selling forward, up the chain, can often be the catalyst to start a new enterprise.

Over the years many examples of integrated farming have come from just that first simple step of sharing sales and looking to add to returns from what the farms produce.

Nuffield Farming travels – what did I see?

Throughout my travels I wanted to investigate how farming businesses had integrated to improve performance or grow their production. The examples in the rest of this chapter are far from exhaustive of my experiences, though the business models given here have contributed significantly to my own conclusions and recommendations given at the end of this report.

10.1. Integrated vegetables and soft fruits

An example of how integration developed through trust in targeting common sales is Perfection Fresh, working in the vegetable and fruit industry of Australia. From early beginnings as a small scale family market garden in the 1970s, growing vegetables for Sydney, New South Wales, this business now has retail sales of A\$800m and over 500 employees.



Figure 21: The Perfection Fresh model started as simple combined selling and now is fully integrated from owning genetics, seedstock and suppliers, producers and glasshouses, through to packing and retail brands.
(<http://www.perfection.com.au/about-us.aspx>)



Family business becomes an integrated company

Started by Tony Simonetta as a wholesaler for fresh produce in 1990, lack of security of supply and market price fluctuations meant the future of the family business was questionable. Retailer strength was a concern, since the pressure exerted on growers and intermediaries, such as Perfection Fresh, was growing: there are only 2 main retailers in Australia with >75% of the fresh produce market sold through them. Tony realised the only way to develop strength and resilience, whilst ensuring supply, was to link primary producer to genetics and expertise to sell product the public would pay for.

Integration for Perfection Fresh began by signing up a few of the local growers who already supplied the company's retail operation, for agreement to wholesale their produce under Perfection's label. The growth from an initial 5 growers in NSW where Perfection was based, to 40+ today across Australia, has come through trust: trust from producers and retailers that Perfection Fresh delivers, along with a drive to improve margin for the whole chain. Taking the initiative to create their own assurance pathway has allowed the Simonettas to have traceability from farm to fork differentiating early on from other "wholesalers."

"The retailers see Perfection as a partner in the supply of fresh produce whilst ensuring traceability and quality with minimal cost to themselves"

"Our aim is to improve the annualised margin to the producer by smoothing out the peaks and troughs of the growing seasons"

Michael Simonetta, CEO Perfection Fresh

Specialist genetics allows for differentiation

The addition of specialised, licensed, product lines was the next step to develop an integrated supply chain. By introducing branded genetics - the first was for Broccolini™ in 1999 - Perfection Fresh proved to the retailers they were a company they should partner with. The portfolio now includes more than 20 unique, trademarked varieties of fruit and vegetables including Qukes Baby Cucumber™ and Midnight-Beauty™ grapes. The license not only protects the company, it also protects the growers and the retailer. This in turn creates added value when a branded, packed fruit or vegetable is sold at a premium with the whole integrated business benefiting.

This model, adding a brand to what is ostensibly a tomato or a grape, means trust has developed by integration between producer through to supermarket. Each brand has its own dedicated supply chain: from seedhouse, through growers, packers and the retailer. Production contracts then support integration through partnership: by integration all members of the supply chain can feel secure to invest in new buildings, modern technology and warehousing.

Integration through partnership

Suppliers such as Germano Cauliflowers in Mirboo North, Victoria, have benefited by being partners within the integrated supply chain Perfection Fresh has created. Using varieties Perfection Fresh has licensed, or will use in specific retailer promotions, gives Emma Germano a market to produce directly for, whilst guaranteed sales means true budgetary controls and allowing investment. It was clear to



see the trust between grower and Perfection Fresh had effectively removed a lot of the risks a traditional vegetable grower would have seen in marketing their produce and ensuring a margin.

In March 2015, when I visited the Germano unit, the farm had just invested in their own floretting machine to produce cauliflower segments for Perfection Fresh. The contract that was in place was for pre-packed, ready-to-use cauliflower florets – something that was entirely new to the Australian market. This not only allowed better sale prices: the process also ensured large/small/damaged vegetables would still find a sale – significantly improving margin and reducing wastage. The farm saw the investment in a floretting system as one that would not have been easily justified without the added security of the contract to supply Perfection Fresh.

What are the benefits to the retailer and food chain?

A food scare in spring 2015 regarding bacterial contamination of fresh berries imported to Australia underlined to me the strength of the model that Perfection Fresh has. All the produce sold through the supply chain is grown on dedicated contract farms, and the chain from initial collection on farm through to the supermarket shelf is managed by Perfection Fresh on behalf of the retailer. As there had been no issues with the berries grown by Perfection Fresh in Australia, and with fully traceable production, the retailer has asked them to develop a 365-day supply chain.



Figure 22: Emma Germano (in pink) and her team picking cauliflowers to supply to Perfection Fresh

Next steps – where can growth come from?

The next step for Perfection Fresh is to develop export markets. With a domestic market of 25 million Australians there is a finite point for growth. Tony Simonetta and his board now feel export to the Asian-rim countries will allow further growth of the business. Having easy access >3 billion people,



with a growing middle class, the target is to expand exports from 5% of 2014-15 turnover to 20% by 2020.

10.2 Selling lamb in the New Zealand domestic market?

Producing and exporting lamb is something New Zealand is particularly good at. To take lamb and add value through creating an integrated chain for farmers, aimed at increased price and domestic sales, is not something I expected to see there.

Coastal Spring Lamb was started by sheep farmers Richard and Suze Redmayne in 2010 to add value to their sheep farming enterprise. With a Masters' degree in Business and Commerce, Richard realised that branding, having a great product and working with a retailer could offer the farm more balanced returns than the export dominated market allowed.

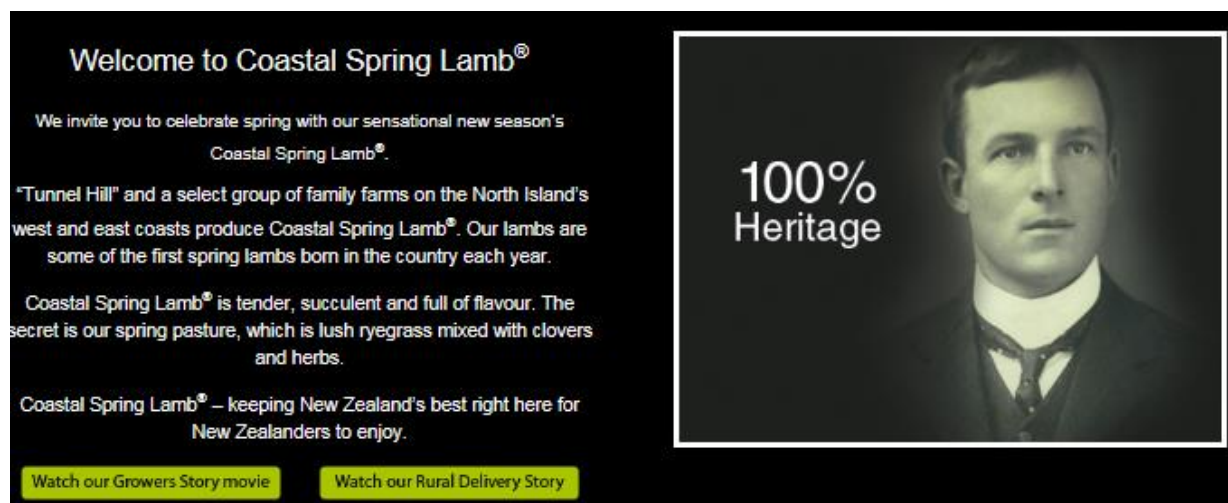


Figure 23: the website for Spring Coastal Lamb reflects the marketing skills behind the business (<http://www.coastalspringlamb.co.nz/>)

A brand offers differentiation

The growth of domestic sales has been driven by branding: a differentiated lamb from what New Zealand consumers expect. The brand offers early season, succulent meat produced from the coastal region of the lower North Island by farmers with a heritage long steeped in sheep farming. This lamb is also packaged differently from those usually found on supermarket retailer shelves, adding to the brand image, suggesting a premium product.

There are now 10 farmer members, with a waiting list of producers wanting to join. The criteria for membership also helps promote the brand – the farm needs to have access to coastal grazing, be willing to follow the management protocols, produce a minimum of 4,500 lambs/year and have at least 100 years of farming history and experience behind it.

Year 1 sales of 2,000 lambs through a few local stores has grown to >30,000 lambs at a national level in year 5. Additionally the equivalent of a further 20,000 lambs has been exported with sales predicted

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to rise to 100,000 head by 2018. Success should be judged on returns – what does this mean to the farmers in the chain? That would be privileged information; however an additional 15% compared to the standard lamb price is the target for Richard Redmayne.

In a country that in 2015 produced 24 million lambs, with 11 million from the North Island, a target of 100,000 head marketed as Coastal Spring Lamb may be less than 0.5% but, for the farmers working in the supply chain, the additional income to the farm could be considerable.

The Redmaynes have a business plan stretching to 2020 with the aim to grow branded exports to 100,000 lambs, meaning the supply chain will need to grow. Richard recognised this growth would require additional costs such as extra staffing, marketing and promotion – *“keeping sheep farming profitable so the family farms continue is really what the brand is all about.”*

The Coastal Spring Lamb model is simple. It is based on:

- Trust – all the farmers want to work with and supply Richard and Suze Redmayne.
- Adding value to a product the producers already have – good quality lamb.
- Simple system – the farmers commit to a number of lambs to market, and they are paid premium for what is sold as Coastal Spring Lamb branded above base.
- Commitment to assurance and traceability.
- Self-managed – future contract driven to grow sales and returns to the group.
- Co-branded – with retailer and processor involved.

Redmaynes @ Tunnel Hill

My name is Rich and my wife is Suze, our kids Sam, Ruby and Sophie are the 5th generation of the Redmayne family to enjoy our way of life here at “Tunnel Hill”.

As a family we are passionate about producing and enjoying food, which led to the concept of Coastal Spring Lamb – presenting you with the very first spring lamb, a genuine seasonal product like Whitebait or Bluff Oysters.

The first exciting steps were taken in 2010 with a few New World supermarkets being supplied.

With hundreds of you enjoying our lamb during our in store tastings last year and being overwhelmed with your support we are preparing to offer you the first spring lamb of 2015 – This year we will be available North and South Island wide.

As a family our favourite way to enjoy lamb is a butterflied leg cooked on the barbecue, rested for 10 minutes and then eaten with friends.

Coastal Spring Lamb allows our families, to share what we have spent generations perfecting, with you.



Redmaynes @ Tunnel Hill

TUNNEL HILL

Visit Tunnel Hill
click here...

Figure 24: differentiating product can add value to an integrated chain: (<http://www.coastalspringlamb.co.nz/>)

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale

A Nuffield Farming Scholarships Trust report ... generously sponsored by The Trehane Trust



Co-branding – adds sales and enables further marketing and promotion

The retail industry in New Zealand is dominated by 2 main chains, of which Foodstuffs has 52% of the total spend. Foodstuffs has two store brands, New World and Pak'n'Save – looking to compete within different segments of the same marketplace. Coastal Spring Lamb has been working with Foodstuffs from its very early days, and in 2014 launched a co-branded wrapper for several cuts of lamb in the New World stores across the North and South Islands.



Figure 25: The co-branding and support of a retailer like Foodstuffs is vital in the strong domestic lamb market seen in New Zealand
(www.newworld.co.nz)

Taking lamb from the farm through to point of sale with retailer co-branded packaging is an example of a balanced vertically integrated business. In this instance the integrator is saving considerable cost in terms of management, marketing, product development and time. Cost sharing, by working in partnership, spreads returns to the retailer and farmers, although this may be a novel model, but the success of Coastal Spring Lamb as a premium product in a country of low population and high lamb supply suggests this concept is working.

10.3 Liquid milk sales into a saturated market?

Green Pastures Movement is a dairy based company working in southwest Victoria to produce free range milk. By integrating a portion of their annual milk production within a single company, a group of 5 dairying families aim to improve their returns whilst creating a brand they could aspire to grow. This business target is to increase value by >30% on every litre of milk sold through an exclusive deal with one Australian retailer, Coles Supermarkets.



Figure 26: The domestic milk market in Australia is brand-heavy, including several organic and A2 milks. Green Pastures Milk is targeted for niche pricing just below A2 but above standard milk (www.greenpasturesmovement.com.au)

How did this start?

Andrew and Linda Whiting bought their 400-acre unit near Simpson in 2004. The returns in Australian dairy farming can be very unpredictable and when the Whitings calculated the cost benefit of artificial fertiliser this was hard to justify, when compared to other costs. The couple looked at organic, even biodynamic, farming, and although they could identify with many of the ideals they could not agree with all the restrictions these farming movements would place on their own farm. Instead they discovered, through a local discussion group, a Victoria-based composting company (Camperdown Compost) that was creating a new model for pasture management called “regenerative farming.”

The Green Pastures Movement was born from the discussion group meetings of a group of like-minded farmers, including the Whitings, who were all looking to follow the regenerative farming model. As the project progressed, the farmers realised they had started to create a new type of milk that could be branded as produced from healthy pastures with minimal carbon footprint. It was in early 2013 they met with an advisor who recognised the added value this milk could bring the farms – leading to integration with a local processor, dairy business and retailer.

The model – integration through partnership

The Green Pastures Movement is made up of 10 businesses working in partnership: the local creamery is one of these. The Whitings approached the creamery to see if they would collect/process/bottle their branded milk, and Green Pastures Movement pays a fee to the Warrnambool Cheese and Butter Factory for every litre it handles on their behalf. The creamery still collects all the members’ production processing any surplus for their own “Sungold” milk.



Figure 27: taking their cue from the different approach to farming the business owners were following, they created a strong brand that helps differentiate from other milks already available in the retailer

The farmers milk 2,200 cows between them with 40-50,000 litres total daily production, depending on season. They work between themselves using 3 calving blocks to maintain a level profile. Currently 20,000 litres are collected 3 times each week to be processed specifically for Green Pastures Milk. This is distributed through 250 Coles Supermarkets across Victoria and New South Wales.

Looking to expand production of their branded milk, a recent trade convention saw a deal signed for an additional 20,000 litres to be produced each week for export to South Korea. The business aims to develop further exports and domestic sales over the next 3 years to see 20,000 litres every day bottled as Green Pastures Milk. On current figures this should be feasible, though with growth again will come the inevitable added costs of staff and dedicated management – though as Andrew Whiting explained the potential is for more farmers to join the group, produce more milk and see more farmers in the region benefit from integration.

See photo overleaf



Figure 28: again a niche product such as Green Pastures Milk requires a good heritage story
(Source: Meat Livestock Australia via mla.com.au)

Co-promotion and industry support

The national retailer Coles is credited with helping the business in its earliest days. Andrew and Linda had taken their product to test at the Melbourne-based retailer with little thought of the response. The feedback from the head of dairy was: *"the product was the best thing that had come over his desk in 5 years"* - and how soon could they get enough to supply Coles? The addition of the retailer to the integrated chain, while using a specialist processor for production and distribution, meant the integration quickly benefited the farmers involved.

Continued integration plans – beef could be next?

A branded beef system is targeted to start in 2018, using dairy and beef crossbred animals from the dairy units. Currently the Whittings grow on, and then sell as store animals, around 100 head each year. These go to a local feedlot which then supplies butchers in the area through a local abattoir. Linda Whiting was keen to grow this to become a Green Pastures Movement-based project, as she believes *"Bobby calves are a serious problem for the Aussie dairy farmer that our customers want to see stopped."*

See Notes with Green Pastures Movement overleaf



Notes from meeting with Green Pastures Movement:

- Use research to develop your integrated chain – advisors are there to help not hinder.
- Attitude is key to getting success from a farmer-led integration model: the farmers involved are the ones who will make this work.
- Growth comes with costs and pressures – take these in your stride and work them out.
- Growing domestic sales allows for steady returns but creates more competition.
- Growing international (export) sales allows for quicker returns but carries higher risk.
- Other areas to develop – will be cheese and beef from the dairy herds.
- Linda Whiting noted that “the second question any consumer asks me is what happens to the bobby calves? This is a big problem which the Australian dairy industry needs to address.



Fig. 29: The author with Andrew and Linda Whiting of Green Pastures Movement

10.4 Pork farms run by a veterinary practice?

Looking at their veterinary practice in 1995 the three partners of the Audubon Manning Veterinary Centre (AMVC) realised the future looked bleak for their farm animal (production) medicine business. Based in the rural south west of Iowa, Midwest USA, the local population had halved over the previous 10 years with farming, and its ancillary industries, bearing the brunt of that decline. Pig farming had formed the basis of the veterinary business alongside cow and calf (suckler cow) units. As Daryl Olsen explained, the owners of the business decided to take a drastic step at that time, and one that many of their peers thought was crazy – they would take on sow farms and drive their own pork production.

Integration through partnership

A local sow farmer was the first to take up the offer to manage his unit. Since then, in the proceeding 20 years, the business has developed to become vertically integrated with a model ranging from feed supply through to marketing finished pigs. As the service grew from initially producing weaned piglets for supply to others, to finishing towards an integrated model, it soon became apparent the vets were building a system others wanted to have working for them – to the point now where in 2014 production was close to 2.5 million head of weanlings from 100 units with 115,000 sows.

From feed mill to transportation the model even includes a slurry and nitrate service employing an agronomist to help manage farm waste. Taking the approach that you have to be a farmer to truly understand the problems, aspirations and blockers faced when running their business, Daryl Olsen



presented the philosophy of the AMVC approach: to offer a one stop service for pig farmers and agribusiness to reduce the stress of producing piglets and finished hogs.

AMVC now owns and operates its own facilities across 4 US States totalling 45,000 sows, to produce over 1 million piglets annually. A quarter of these are finished through their own hog barns with the remaining 750,000 sold, or contract finished, via partner operations. A further 70,000 sows are contract managed for various third parties on 30 units across a total of 7 States to produce 1.5 million piglets. In total 250 finishing sites and overseen with throughput of 750,000 hogs including their own 250,000 each year. Turnover in 2014 was \$300M and 50% of this came from the management company itself.

“Our aim is to offer pig farmers and agribusiness the opportunity to produce finished pigs without the stress of managing their own farms”

“To quote Sabhash Chandra – I believe it’s only the people who have their skin in the business who’ll really work towards its success”

Daryl Olsen, DVM and CEO Audubon Manning Veterinary Centre



Figure 30: one of the founding partners of Audubon Manning Veterinary Centre, Daryl Olsen DVM



Grow-Finish
Production
Management

Sow Farm
Production
Management

Herd Health
Management

Nutrient
Management
Planning &
Coordination


Data Processing

Facilities
Construction &
Maintenance

Accounting &
Financial
Management

Human Resources

Management Services



AMVC Management Services is your solution for total herd management from birth to market. We take great pride in the services we offer and the results we produce.

Figure 31: Audubon Manning offers a complete integration for pig production

Divisions now include:

- Management Company – including tiered management for career progression.
- Nutrition and feedmill to produce dedicated, specialist rations and formulations – giving savings in production and supply: improving margins on production and feed conversion efficiency with the input of the nutritional team.
- Auditing and performance management team – giving oversight to the board and contract farm owners of production. A division of dedicated auditors working alongside a team of statisticians producing weekly, monthly and annual key performance indicators.
- Education and training – ensuring learning and best practice across all areas of the business.
- Waste management and agronomy – oversight of all waste products including spreading/land management for further integration.
- Transport – for moving stock and marketing end product.
- Research – to investigate new technologies, new products and new methods for production.

Daryl Olsen sees the AMVC model as a “first tier marketing business – we buy and sell pigs but not the final product, we sell pig meat. Slaughtering and selling of pig meat in the USA is a huge business, and AMVC are only a small player.”



To grow an integrated business staff management and training is key

Employing nearly 500 staff, human resources has been identified as the number one priority for continued expansion and integration. Internships, scholarships and career fairs are used to recruit the best employees and there are then specialist training programmes to develop these people. A career pathway has been produced within the management company to encourage staff to remain and develop, minimising loss of good employees.

The management company has a definitive structure that has been replicated from the motor industry production line system. The main group of staff, farm workers, are referred to as “animal caretakers” within the AMVC business as they are seen as beyond basic farm staff with a process of constant evaluation and continued professional development aimed at maximising production and animal welfare:

- Vets – oversee whole zones of production with reports from line managers, auditing team and reporting to the board of directors.
- Line Managers – oversee production units with team leaders reporting to them.
- Team leaders – oversee specific production areas or sheds to have dedicated tasks undertaken such as farrowing or weaning.
- Workers – employed for dedicated tasks and trained internally to the standards expected by the company.
- Auditing and Management team – a dedicated division within the company that utilises latest technology to oversee production and quality standards. Made up of statisticians and accountants, the auditing team ensures best practice through continuous monitoring and measuring.



Figure 32: AMVC offers scholarships and internships to draw the best recruits, with excellent education linked towards career development for the employees. (www.amvcms.com)



Scale allows better management

AMVC now manages over 70 sow farms and a further 250 finishing units. This scale not only maximises the margins across all areas of the integrated business it also allows for a more professional approach to management. Although a dedicated management structure can prove costly when the business covers a large geographical area, and a significant number of sites, the losses due to inefficient production could also be significant.

What came first? The auditing and management structure – and as throughput grew the levels of management matched this growth. *“Taking scale forwards was easier once we had the model and management system right.”*

With 2.5 million piglets produced the unit cost per head towards management is minimal; however these results speak for themselves: extremely low morbidity and mortality alongside high feed conversion rates and finishing numbers means attention to detail has repaid AMVC.



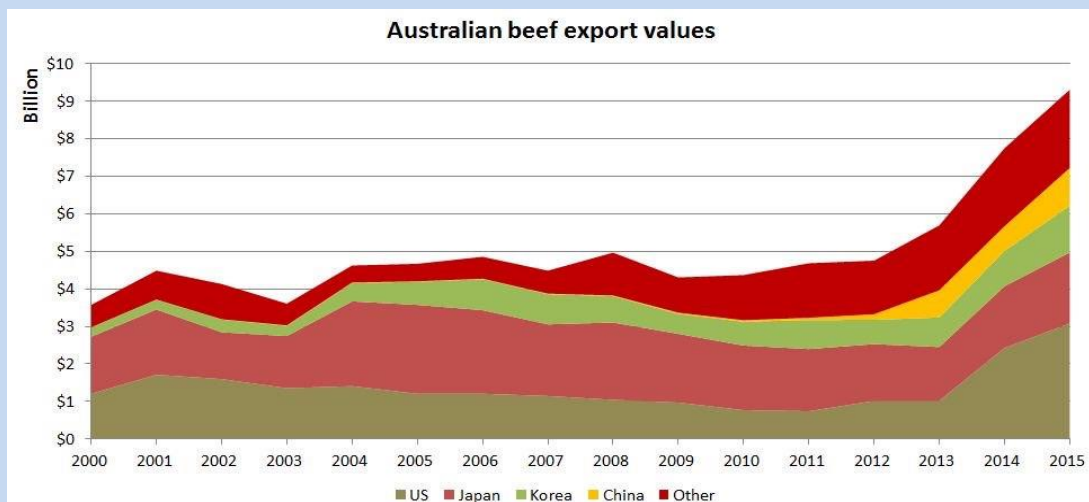
11.0. So is anyone actually integrating beef?

Beef farming at a global level is based on grass-grazed suckled beef with often intensive finishing systems using cereals, ensiled forages, straight feedstuffs and now, more often, by-products from other industrial processes. The system has changed little in the last 50 years other than in size of the units, as economy of scale helped reduce the cost of production. While agribusiness has moved to develop more and more efficient production through integration, the beef supply chain has been largely left in the hands of individual farmers – or has it?

All the countries I visited have a thriving dairy beef industry. Apart from Australia, all have moved to finish increasing numbers of beef from dairy herds. I have decided to divide the beef systems I saw between process and scale rather than by country. In each of the countries I visited there were good examples of small, medium and large scale enterprises where beef has become integrated.

Australia doesn't do dairy beef

The comparative size of the national beef versus dairy herd affects the ways processors, and retailers, look at beef from the dairy herd. Unlike every other country I visited, the Australian attitude to dairy beef was on the whole negative.



Despite rapid price inflation and reduced production due to drought, there was no real encouragement from any part of the beef supply chain towards the viability and sustainability of dairy beef. It is clear the marketplace for Australian beef is valuable. With an export-led industry there would seem, at least to me, to be opportunities to utilise dairy beef, before even considering the moral obligation we have to using this by-product?

The pressure from public perception and various NGOs toward bobby calf animal welfare was noted to me by farmers, dairy processors and retailers in both Antipodean countries. Australia uses almost no dairy beef compared to neighbour New Zealand, where 70% of all the beef produced started in a dairy herd and is of huge value to their export trade.



Figure 33: Bobby calves being collected in Victoria. More than 400,000 calves are collected and processed each year from the Australian dairy industry

The attitude of the processors and end users to using dairy beef has tremendous bearing on the outcome of any integrated chain. I witnessed several schemes where a supply chain had been created due to demand for more consistent and contract-priced beef. The drive from the end users - such as McDonalds' restaurants or retailers - can have a significant impact on the supply chain. "Pull through" by the end user, calling for a consistent and stable supply of beef, encouraged farmers to work together to take Holstein Friesian bull calves, and in more advanced models even create pregnancies from selected bulls, for a dedicated market.

The examples given below are a few of the businesses and supply chains I met with through my travels.

11.1. Farmer-based integration

Groups of farmers working together to form their own supply chain without the additional costs of full integration do happen in agriculture in general – but what about beef?

Halinga Oü, Estonia – short chain, integrated dairy beef

Taking on the former Russian commune dairy farms in Parnu County, Estonia, the owner Raul Peterson realised he needed to invest and consolidate the milking enterprise if the company was to have success long term. Since 2009 a total of €6.4 million has been spent building a new state-of-the-art, US-style dairy unit to house and milk 2,100 cows, alongside conversion of some of the older, cow-house style buildings into youngstock and dry cow facilities.



Beef production was an area identified for potential income source. A local butcher was approached and a new venture started in 2010 taking dairy bulls from the farm through to slaughter at 12-13 months old. This was expanded to include a dedicated set of buildings on one site:

- A housed feedlot (conversion of a former Russian cow-house).
- A dedicated low throughput abattoir – handling up to 30 head per day.
- Staff buildings and offices.

The business now employs 10 full time staff from the farm side through to office and distribution. Local farmers are now paying to use the abattoir for their own cattle as well as local hunters to process wild game that can be then properly dressed and health-checked for sale into the food chain.



Figure 34: Housed feedlot system at Halinga Oü with bulls rearing through to 550kg liveweight

In 2014 the Halinga Beef Company processed 450 head of its own stock from the dairy farm. The distance from the finishing shed to the reception at the lairage is 200 metres. The value to the farm itself is around €200/head more than if they were to have either sold the bulls to a third party (usually to then export by road to Kazakhstan or Holland for veal), or had them dispatched on the unit and paid for disposal. Add to this the unmeasured savings/benefits of the better use of the calf rearing and youngstock management facilities (all dairy calves are reared as one) alongside savings/economies of scale from using second grade/refused dairy feedstuffs to finish the cattle.

To the local economy the benefit derived from the abattoir and processing business is worth an additional €200,000 or more in direct jobs etc. No wonder the business received a 50% grant from the European Union for the building works and training.



Figure 35: The abattoir reception for cattle at Halinga Oü.

A to Z Feeders, Iowa, USA – adding value to dairy beef

Finishing Wagyu cattle for a specialist market was proving a good source of income for this family-managed feedlot outside Atlantic, Iowa. The farm was being asked to source more and more cattle as the US trade for quality meat became tighter, and prices were rising. Keeping the 3,000 head feedlot full was also becoming a challenge for the Zellmer family. The challenge was to find a more consistent supply of stock – and that is when dairy bred Wagyu came to be involved.

In 1987 Allan Zellmer, the 5th generation to farm at Zellmer Farms, took on finishing contract cattle alongside his own, small scale feedlot. With a young family it was important to expand the farm beyond the 300 head cow and calf ranch system and 300 head finishing unit. Investment into new facilities meant capital was needed, meaning more throughput was a necessary part of the business plan. Now the farm finishes over 5,000 head of mostly Wagyu bred cattle, some from the Angus cross herd but the majority will be bred on dairy units.



The system now has an integrated breeding programme with other local Angus farmers to allow for hybrid production of Wagyu x Angus (from ¼ to ¾ bred) and a nucleus herd of Wagyu from imported semen/embryos. Taking on a breeding project with two dairy units in California has seen 5,000 head of Wagyu cross Holstein (called Happy Cows by Allan Zellmer) to increase throughput further.



Figure 36: Allan Zellmer with 100 years of family farming history on the wall beside him

Semen sales are a major part of the business – with around 20,000 straws of both full-blood and cross-bred Wagyu semen sold in 2014. The business is developing further to allow for the next generation of the family to have an income from the farm and the cattle company.

Having a nutritionist as a son-in-law has allowed further expansion, with the integrated business now including:

- Custom growing – taking calves through to heavy store weight working with units in Texas.
- Custom feedlot – finishing their own and contract-fed cattle.
- Nutritional consultancy – for the whole beef system.
- Breeding and stock sourcing – providing AI and ET for Wagyu breeding.
- Farm consultancy – to new entrants and experienced farmers wanting to work with A-to-Z.
- Marketing – cattle sales and meat management to maximise returns.

See over page for photo of nearly finished Happy Cows (Holstein x Waygu), having just been fed.



Figure 37: Pen of nearly finished Happy Cows (Holstein x Wagyu) having just been fed.

Finishing cattle in the US can be influenced by the ability to use hormones and feed additives. A-to-Z's philosophy is to avoid using these products – and “let the genetics and the nutritional management work through” to finish. When I visited a batch of 80 Wagyu x Holstein cattle had been processed with 90% graded to qualify as Certified Black Angus despite no Angus genetics, whilst the Wagyu buyer had selected them all as high grade for his restaurants. All this despite using no additives, and the animals were under 28 months old yet with a 450kg carcass.

Ford Farms, Surrey, UK – taking dairy beef from local farms

“Buying store cattle to finish brought bovine TB (tuberculosis) onto our farm,” explains Mr Ford, *“with the TB tests ending with most of our beef herd culled.”* Losing their 150 cows left Edward and Lara Ford with a decision: to carry on breeding and finishing beef to a scale that let them utilise their buildings and staff, or not. As Lodge Farm was, at that time, the centre of a 1,000-acre arable business, beef was viewed as a viable enterprise: using second grade cereals, growing maize as part of the rotation, and grazing grassland that wasn't suitable for cropping.

TB was a risk the Fords were not prepared to invite onto their farm again. When the TB was confirmed as a spogliotype originating on a West Midlands farm that had supplied store cattle to Ford Farms two years previously, the decision was made for them: cease keeping beef suckler cows, stop finishing store cattle and increase the beef rearing and finishing operation. All the cattle finished would have been born and reared in the region.



Figure 38: Pen of recently arrived growing cattle, all bred from dairy farms within 20 miles of Ford Farms

Farming in an area with a dearth of dairy herds (there are only 20 herds in Surrey still in milk production) but with the target to finish more than 1,000 head per year meant a new approach was needed. The model that was developed started in 2008 and has grown from 300 to 900 calves processed in 2015. This works by:

- Setting up an integrated chain needing to source calves, rear and then finish.
- Working with the local veterinary practice and its dairy producers to identify of farmers willing to work with the Fords. Calf breeding has been maximised with these producers to ensure the mix of dairy, continental and native animals are all supplied to the farming business at prices that are transparent to the farmers and the system.
- A local calf dealer is employed to purchase and move calves to the rearers, and again then to other farms to grow on, or back to Lodge Farm to enter the finishing process.
- Calf rearers work with batches of calves – often 30-60 at a time – to produce weaned calves at 110-120kg at 12-14 weeks old.
- Feed and nutrition is optimised using a single feed company and nutritionist to all the farms in the chain. This keeps consistency for growth as well as minimising price negotiations to a single point – the Fords.
- Grower farms take weaned calves or store size cattle to graze/manage through to 350-400kg before these move back to Lodge Farm to enter the finishing cycle.
- Finishing is undertaken at the one site – with batches of dairy bulls, steers and continental bulls/native steers and heifers managed by a team of stockmen overseen by the Fords. All bedding and forage is produced on farm, with the majority of cereals and hard feeds grown on the farm or locally sourced.
- All movements, management and marketing of the cattle on any of the farms is undertaken with the input/support of the Fords.



A calf rearing and youngstock plan was developed and managed by the Fords on each farm in the supply chain. Consistency is the key to good growth and healthy calves – with key performance indicators measured and monitored alongside review meetings with vet and nutritionist every 6 months.

The majority of cattle are processed for a dedicated brand (Surrey Hills) through a local abattoir in Guildford. The food miles and carbon footprint of these animals is seen as optimal when much of the meat enters the local food chain or restaurants in London/South East. For 2015 the target of 1,000 head finished should be met – and good demand for South East beef has encouraged the Fords to expand with plans to build two new finishing sheds to increase throughput to 1,500 or more p.a.



Figure 39: Nearly-finished dairy bull, will be slaughtered at 12-13months old, 280kg carcass and 50% grading O+ or R+ to return healthy margin to Ford Farms.

Since starting the integration process the crop farming and contract management portion of the business has also grown: now farming in excess of 3,000 acres including some 500 of grazing land. Head count of staff has also increased, meaning more staff available in the winter for cattle management.

Note: A successful model the author has been involved with since 2000, Ford Farms was one of the drivers for his decision to undertake a Nuffield Farming Scholarship based on integrating dairy beef.



Te-Mania Aberdeen Angus, Victoria, Australia – pure breeding beef bulls in an integrated way

At the British Cattle Breeders Conference in January 2015, Tom Gubbins, co-owner of the largest Breedplan (Australian EBV system) recorded herd of Aberdeen Angus in Australia, told commercial beef farmers to stop buying on pedigree and use estimated breeding values (EBVs) if they want to survive against increasingly efficient white meat producers.

A world-leading Australian beef breeder has told his UK counterparts it is time to ditch showing and embrace estimated breeding values (EBVs) if they want to survive against increasingly efficient white meat producers.

Pedigree Angus breeder Tom Gubbins of Te Mania Angus, Victoria, said: "Showing is a thing of the past. It served its use well when we didn't have any other methods of breeding cattle, but it damages data."



See also: [Have your say: Is cattle showing holding back genetic progress?](#)



Tom Gubbins

Mr Gubbins, who runs a herd 1,400 breeding females in Mortlake, Victoria, said showing no longer had "any industry relevance".

He explained show animals could not be accurately performance recorded when they were being kept in a different environment to the rest of the herd.

"We need to start engaging people about EBVs and how we do that is we talk about it more and fear upsetting a few people, but we have to change it or we will be overrun by the chicken and pig industry.

"We are the lowest common denominator. Every time they make genetic gain and lower their costs it displaces beef from the supermarket," Mr Gubbins warned fellow farmers at the British Cattle Breeding Conference,

Figure 40: The Farmer's Weekly report on Tom Gubbins's visit to the UK in January 2015

With 1,800 females bred and 1,600 to calve down, sales of 800+ commercial bulls plus a solid meat business, Tom and Lucy Gubbins, the family behind Te-Mania, know what they are talking about. By integration the business has grown their breeding plan (EBV) data set to encompass 40 other commercial beef operations – to total over 30,000 calvings and 60,000 head. This means data for performance from bulls through to carcass traits are continually being updated and the EBV being refined.



Figure 41: Tom Gubbins shows the author some of his fodder beet being strip grazed by a mob of 300+ weaned bulls

Many of the top Aberdeen Angus bulls currently used in the UK, for dairy and beef cows, have their roots at Te-Mania. Consistent breeding, managing animals in contemporary groups to remove environmental forces, and culling when the data suggests a line is not performing to plan, has led to dam and sire lines with very reliable results. This means when selling bulls each season Te-Mania averages 700+ bulls at A\$7,000 or more – and there will be few Angus herds in Australia or commercial herds that do not have some genetics based on the Te-Mania breed lines.

“Every commercial cow put to beef should be assessed and bred according to its maximum genetic gain to maximise the return to the beef farmer”

“We target genotypical breeding to produce profitable, uniform animals by using data, data and data. Computerised recording, using Sapien, has revolutionised our herd performance.”

Tom Gubbins, Te Mania Angus, Mortlake, Victoria

If a line is found to be under-performing then that whole cohort will be earmarked for beef. Utilising a cloud-based data recording system (Sapien Technologies) all animals are EID'd and followed through from birth at key points in their lifecycle. Technology is also used for testing all bulls and beef breeding. Ultrasound scanning of muscle depth, semen testing, testicular morphology evaluation and carcass marbling are some of the traits measured, monitored and evaluated for future EBV refinement.

Breeding for beef from dairy herds (or cows) is still very uncommon. When I met with Tom Gubbins I put to him the difference compared to Australia between the UK and New Zealand for Angus breeding

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over dairy cows, compared to that in Australia, to him. His initial answer was of scepticism, even concern, over using Angus cross Friesian in the beef supply chain and branded as “Angus beef”. However, he conceded there would be potential, were such a scheme to become popular in Australia, for additional sales plus exports.

I met with Tom again, three weeks later, in Melbourne to visit the team at Sapien Technologies. He was keen to inform me of his latest sale – on the back of a visit by a dairy company director: 11 Te-Mania Angus bulls were heading to Wykiri Farms. This group of 10 dairy herds had been reviewing their carbon footprint and realised a “direct action plan” was needed including starting their own integrated beef supply chain. They wanted to use Angus on all their poor breeding animals and for sweeping when grazing.

11.2 Medium scale or investment-based integration

As scale is brought into any farming operation capital becomes one of the main limiting factors. Having additional partners, farmers or even agribusinesses allows models to expand and gain additional levels of management within the integrated chain. Some of the beef supply chains I met were already large scale compared to what we would expect in the UK, however, when looking at the global level these businesses were still only handling numbers of cattle that makes them medium sized in my opinion.

AMVC, Iowa, USA – the next development

Having seen their model work for sow farms, and hog finishing, the AMVC board have now moved to develop a similar model for beef. A pilot started in 2011 taking black and white bull calves from two local dairy producers. A new division was created that included a calf production facility, specialist growing and beef finishing. Throughput in 2013 was 3,000 head finished and the plan was 15,000 head of throughput by 2017.



Figure 42: Dr Bob Blomme, DVM with his calf rearing facility in a force-ventilated, former sow farrowing building



“Working in partnership with specialist beef producers has,” explained Dr Bob Blomme the AMVC Director responsible for the beef project, “allowed us to expand within the area of Audubon whilst also ensuring our initial trial had sufficient scale to investigate if this was viable.” The initial capital for the start-up came from the directors’ own pockets; however now the model has been proven the funding is coming from other farmer investors and institutional investors where the risk of beef farming is seen as low to medium compared to the level of return. The integrated supply chain is working here to create a positive system for the dairy bull calves as well as providing income for local business.



Figure 43: finishing Holstein bulls in a housed system on contract for AMVC

By using their proven integrated model: with nutritional input, management and auditing, costs are being minimised to the company, whilst quality and consistency of output have been targeted. All the farms involved have seen returns through this integrated approach including the dairy units where they are now moving towards beef sired AI to breed cross bred animals for the beef finishers.

HoopBeef Farming, Iowa, USA – beef production with a difference

The farm at Grand Meadow Feeders is based on finishing housed (“confined” as the US farmers call it) beef through specially designed tunnels. These hoops have been trialled by the founder of the system, Dr Bob Bryan DVM, since the early 1980s with one of the tunnels currently used being 25 years old and still going strong. Taking his experience from the pig industry of confined buildings, comfort and management, Dr Bryan has built up HoopBeef from one hoop of 300 feet to now over 22 miles across the mid-west region. The design works without any mechanical ventilation in both the $>30^{\circ}\text{C}$ summers and -10°C winters with heavy snow falls and strong storms common. *“The cost per animal space is around 50% of that seen in a conventional building but the benefits are beyond cost – the environment and the animal health are also better.”*

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Figure 44: the view of Grand Meadow Feeders across a field of GMO soya

All the cattle being grown and finished at the site, near Washta in Iowa, are dairy bred from local herds. The farm is currently finishing some 5,000 head each year on this site, and has integrated with several other HoopBeef farms to manage and finish a further 15,000 head. A local abattoir processes the Gelbvieh X Jersey-cross dairy bred animals entered in the Certified Black Angus scheme as they regularly grade >90% prime beef with 300kg carcass at 15 months old. Holstein dairy bulls are reared and finished separately to be slaughtered on contract for one company (see later) within a larger system of beef farming.



Figure 45: the author with Dr Bob Bryan, DVM, and founder of HoopBeef Farming

Alongside the beef production side of the operation sits a dedicated beef suckler (cow and calf) system. This allows farmers to source a group of 250-300 heifers at point of calving, as nucleus beef herds, in order to start up new sites of beef farming, mainly arable farms where grazing/cow manure



is required. HoopBeef works through a fully integrated business to offer the farmer a “*one stop shop from calving heifer to marketing of the feeder cattle*” according to Dr Bryan. Whilst I was visiting, the US cow and calf inventory had reached its lowest level of breeding females in 50 years – and orders were also coming in for HoopBeef to supply established beef grazing farms with in-calf replacements.

The integration starts with the local dairy farms – milking some 30,000 cows within 100 miles of Grand Meadows site there are 6 farms supplying calves into the system. The Holstein or other dairy cross cattle are finished by a set of partner farms while the beef cross, mostly Gelbvieh, come to the HoopBeef team. Calves are reared by a third party (see later under Den Dulk Dairies) until 200kg in weight when they are shipped to Iowa for the HoopBeef team to take on.



Figure 46: HoopBeef Manager Tim Bickett looking over a batch of Gelbvieh cross cattle in a hoop building

Breeding and management of the heifers is overseen by a dedicated team of staff on two units close to the main site. The buildings at Grand Meadows only house batches of 250 to 300 head of cattle; either on feed (empty heifers or steers) or close to calving pre-sale. Hoops to match each portion of the lifecycle from 200kg to mid-pregnancy and on to finishing means optimum stocking densities are always followed ensuring the buildings work to their design.

Westview Farming, Manawatu, New Zealand – investment in farming since 1987

When Nicola Shadbolt and Shane Carroll started Westview Farming they were share milkers. The business is set up with 5 original partners each investing NZ\$150,000 to the fund in 1987. In 2014 the fund had a value of NZ\$20 million, with 1,000 dairy cows, a beef herd and finishing unit, sheep and deer farm. The company has a diverse, yet integrated system to manage the land it owns and farms.

Integration was seen by Nicola as an important, and necessary, business step: “*We needed to keep costs down, maximise our opportunities and ensure we retained as much capital within the business, especially in the early years.*” Some may recognise Nicola as a Director of Fonterra but more, especially in New Zealand, would know her as Professor of Farm Management at Massey University with multiple business and accountancy degrees.



Figure 47: Taranaki Tigers are red Hereford cross cattle reared for beef at Westview Farming

Having this background of agriculture and economics allowed the team to find the other 4 investors through an advert in the newspaper “*if you’ve got the money we’ve got the expertise – let’s get together*” was what Shane said. And this worked, attracting enough funding to start the operation. The same investors are still all involved with the business 28 years later and reinvesting year after year into expansion of the farm enterprise.

The farm milks 1,000 dairy cross bred cows – mating for replacements to Jersey or Kiwi-Cross Friesian, and then Hereford, retaining all its dairy youngstock, unless the bull calves are seen as too light. All the stock is reared initially on dump colostrum and milk, saving costs, managed using a cloud based system and EID to ensure good stock control, and to apportion costs so each system can be measured for income vs cost to the company.

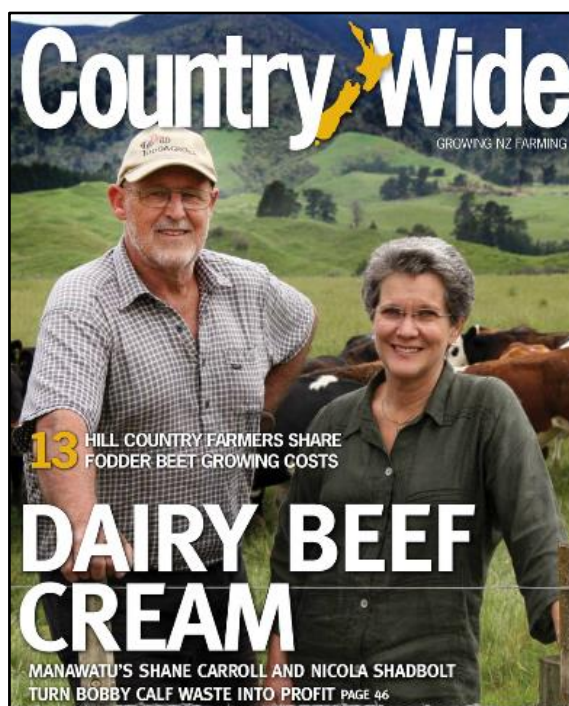


Figure 48: Nicola Shadbolt and Shane Carroll want to see farmers make more from their dairy cows



About 800 head are kept for beef each year, and managed within the farming system as:

- A portion of the best Hereford X heifers (usually red headed) are retained for replacements for the 200 cow beef herd that grazes the higher pastures.
- All remaining Hereford cross calves (called Tigers by the farmer) are then reared for beef:
 - Tiger red bulls – techno grazed and aim to finish at 270kg carcass at 14-15 months old.
 - Black Tiger bull calves are steered, then kept with black headed heifers – paddock grazed with dairy replacement heifers through to 28 months old and slaughtered for a 380kg carcass.
- Dairy bull calves are kept entire for first winter and then:
 - Steered if larger to graze through and aiming 380kg carcass again at 28 months old.
 - Kept as bulls to finish at 14 months old for 250kg carcass.

“Dairy beef is really the cream of the dairy herd: it is added income from the cows we would not otherwise have. The margins are good due to optimal use of the available land and staff utilisation is maximised”

Shane Carroll, Westview Farming

This system allows staffing, grazing platform and production units to be maximised to the benefit of farm income. With a beef herd there is opportunity to produce higher quality beef though Silver Fern, though processing beef for export markets is always in demand. The income from the retained dairy beef helps offset a significant portion of costs: two thirds of the retained cattle are killed by 14-15 months old with a sales target of NZ\$1,500/head, ensuring the system adds a good profit to the farm.

Retailer invested scheme – Blade Farming and Sainsbury white veal system

How do you manage TB-restricted calves on your dedicated dairy supply chain farms? When you have a scheme set for collecting and marketing the bull calves where the farmer is guaranteed a good price, having TB-restricted stock is even more difficult to integrate. This is the challenge the UK-based retailer J Sainsbury handed to beef supplier ABP, and in turn this passed to Blade Farming the integrated beef business operated by the processor.

Richard Phelps, Business Director, described the solution as very simple yet efficient, where value is added to what would usually be seen as a valueless animal – the TB-restricted Holstein bull calf. Taking a group of new entrant calf rearers and creating, from scratch, farms that would rear batches of bull calves from 7-14 days old through to slaughter, as white veal, was a project the Blade team relished.

“Due to the TB controls we had to find an indoor system that offered the retailer all the solutions needed to manage this sensitive subject,” Richard explains, *“producing veal on any scale in the UK hadn’t been done since the early 1980s and we wanted to have RSPCA Freedom Foods accreditation so that added complexity.”*

The system is based around a fully integrated supply chain:

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale

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- Calves are collected from Sainsbury Sustainable Dairy Group farms every 2 weeks.
- Sheds are filled with a batch of 100 calves over a maximum of 14 days on each unit.
- 14 sheds are involved with 6 producers producing 2,600 head of veal annually.
- Fed ad-lib milk from a dedicated milk supplier using “starter” and “finisher” blends.
- Veterinary health plan followed from start to finish including haemoglobin monitoring.
- Animals are finished at a target 110kg deadweight at 20-22 weeks old.
- Meat is processed at one ABP abattoir and bone/packed for scheme.
- Veal sold as specific branded packs in Sainsbury supermarkets.

Various challenges were overcome to set up this branded scheme. Starting from scratch on a batch veal production system, where consistency and quality sat alongside RSPCA levels of welfare and environmental management, has created an integrated model that really should be seen as best practice for UK black and white calves.

Note: the Sainsbury Veal model was one the author was involved with from inception to completion: the Blade Farming Veal Scheme was one of the drivers for my decision to undertake a Nuffield Farming Scholarship based on dairy beef integration.

11.3 Large scale or company-based integration

Scale offers a real advantage when looking at managing the supply chain and maximising the return on beef production. The following three examples of integration show how maximising return from a system has been created by planning and strategic management.

Agrib Beef, Idaho, USA – a fully integrated beef supply chain started as a family farm

Farming, processing and marketing 400,000 head of cattle in 2014 made Agrib Beef one of the largest single supply chains in the US. Still family owned (started in 1968 as a ranching business), the company is based in the Pacific North West, consisting of ranches through feedlots to their own processing, boning and packing plant. It has four beef brands, and works in partnership with local retailer Alberstsons, to promote Double RR Ranch in its 600 stores as the main outlet for Agrib Beef.



Figure 49: marketing for Agribeeef and Albertsons co-branded Double RR Ranch at Boise airport.
When did you last see any beef brand marketed like this in Britain?

No dairy beef is used in the system currently, though with the carbon footprint and following a five-year run of low rainfall this may change. The beef comes from their own, and partnership-owned, cow and calf ranch operations in the mountains of Idaho through to Washington and Oregon. With mostly Angus X cows, a hybrid Angus x Wagyu bull is used to produce beef that is then utilised according to the carcass grading system. About 10% of stock produced each year is at least 50% Wagyu-bred.

Staffing for the company is overseen by a central HR team: consistent monitoring and managing of the workforce from the ranch to the boning hall allows for development and retention of good staff. The auditing is managed using a cloud-based system with stock control, nutrition and cattle inventory all followed closely. Cost control at the company level is vital to ensure margins are maintained throughout the production chain.

EID was introduced a number of years ago with all cattle given their own unique farm and animal number (similar to the EU cattle ID system) allowing full traceability. Consumer confidence is important to the retailer and the company – so using the EID an animal can be followed from farm to fork by Agribeeef.



Our Brands

Agri Beef Co. is proud to be a family-owned company offering four premium brands to the marketplace: Snake River Farms, Double R Ranch, St. Helens and Rancho El Oro. These brands promise to consistently deliver the safest and highest quality beef and pork. Our beef and pork products are sold across the U.S. and exported to over 25 countries around the globe.

Agri Beef products have an unparalleled reputation for quality and are found in top rated restaurants and retailers around the world, including a number of Michelin Starred restaurants.

Snake River Farms manages our Wagyu-Angus cattle and Berkshire hogs from start to finish. This extraordinary care makes Snake River Farms American Wagyu Beef and Kurobuta Pork the finest meats available.

[SHOP NOW](#)

Double R Ranch Northwest Beef is a premium beef brand from the heart of the Pacific Northwest. Double R Ranch beef is hand selected to include only USDA Choice and higher levels of marbling.

[SHOP NOW](#)

St. Helens Beef embodies the exceptional quality of Northwest grain-fed beef. You can count on great tasting, tender, nutritious beef every time.

Rancho El Oro Beef is recognized for its exceptional quality and value, and is produced specifically to meet the unique needs of the Hispanic marketplace.

Figure 50: multiple brands allow Agribef to maximise their return on every animal processed

Branding maximises production: Agribef uses the same meat for three of its four brands. This is based on the carcass grade and not the breed:

- Snake River – the Wagyu branded beef with most exported outside the USA.
- Double RR Ranch – the premium range utilising 100% choice, or above, beef.
- St Helens – the mid-range to supermarkets and caterers.
- Rancho El Oro – the bottom range of beef for the saver menus.

The USDA system of carcass grading ensures not only meat yield is quantified but also assesses the level of marbling, back fat and eating quality. In the Agribef system the target is >70% graded prime. Boning and packing takes place following grading and maturation with the aim to sell as much of the product upwards in the brand ranges offered.

Firstlight, Hawkes Bay, New Zealand – producing high quality grass fed beef

Started in 2003 by Gerard Hickey the aim of this integrated business is to produce the best grass-fed meat in the world. Originally a venison producer, Firstlight entered into a Primary Growth Partnership with the New Zealand government in 2010 in an aim to improve the welfare of bobby calves from the dairy industry. A key partner is a Japanese Wagyu breeder looking for grass-fed Wagyu beef to sell into



Japan and the USA. This partnership brings the highest quality Wagyu bulls to maximise carcass grades for the best return to the business.



Figure 51: the Firstlight mission statement. How many UK beef farmers have one of these?

The business last year produced 12,000 head of dairy-bred Wagyu X alongside a further 12,000 of beef bred animals from Wagyu X Angus cows. To produce this number of pregnancies has taken an integrated approach from the team – with dairy farmers looking to maximise their profitability on each dairy cow. Easy calving, valuable calves, that fetch a guaranteed premium compared to selling bobby calves (NZ\$3/kg compared to NZ\$1/kg), plus subsidised semen, has helped attract dairy herds to the system. The biggest supplier is Landcorp (also NZ biggest dairy farmer) with 20,000 inseminations planned for 2015 breeding season.

Working in partnership with contract rearing units, calves are grown based on the weight gain and days on unit. Integrated beef farmers then take the calves in batches of 50 head at 90kg at 12 weeks of age. The aim is to graze them from that point through to finish at 24-30 months old, with the best farms achieving carcass weights of 300kg at 22-24 months old and marbling scores of 8-9/12 on the Wagyu scale – so performing very well.

With no grain fed other than in the initial calf rearing stage, the production system relies upon a team of fieldsmen to follow the batches of cattle and help manage the grazing. The cattle are drawn weekly to slaughter 50-100 head per day over a six-month period. Carcass grading is then undertaken based on Wagyu parameters with the best 20% sold for export to Japan and the USA as grass finished Wagyu, whilst the remainder are exported as “grass finished beef” around the Pacific Rim.

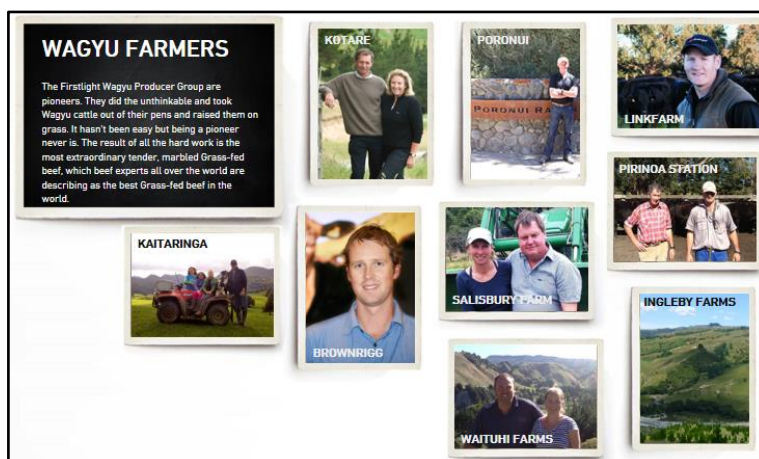


Figure 52: the integrated chain includes farmers and managers working to maximise returns

Meeting Gerard Hickey it was clear the drive is coming from the entrepreneurs of the New Zealand dairy and beef industries. His clear goal is great steak and increased value to the farmers working within the supply chain – looking to double the return per kilogram of beef produced. Producer Scott Linklater of Link Farming is also a producer-director representing the farmers and finishers on the board. He said: *“This year we have seen NZ\$5.50/kilo sold off our farm compared to NZ\$3.90/kilo and as the exports grow we will benefit more again.”*

Gerard Hickey: graduating with a degree in Business Management, his aim is to produce the perfect steak from dairy beef finished at grass. Having undertaken his Honours Dissertation looking at integration – basing a large portion of the resulting report on Bernard Matthews in the UK – it became clear to Gerard that “New Zealand has the benefit of great grass and good genetics but our beef was not valued. Full blood Wagyu were too costly to finish whilst our dairy cows were generally too small in stature – so we came to produce a hybrid bull that works for feed conversion efficiency and carcass traits we want.”

Continued on next page



Figure 53: grass-fed beef sold in Wholefoods Supermarket chain in California from Firstlight.

Den Dulk Dairies – working with meat processors and beef producers to maximise returns

Owning and managing more than 200,000 cows on 40 separate dairies is not something many farmers would aspire to. Tim Den Dulk has a family business, AgBoss, that includes Den Dulk Dairies, trades from its group offices in the centre of Chicago, with staff working on farms from Washington State to Florida.



Figure 54: young calves being checked by Karl Den Dulk and the team on of the Amish rearing farms

One of the founders of Fair Oaks Dairies as well as several other noted dairy companies, Tim Den Dulk looks to maximise the yield from the farms by more than just selling milk. The company has added value through integration with:

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale

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- Dairy production – owning shares and producing for cheese brands, FairLife Milk (co-owned with Coca-Cola) and trading on behalf of many farmers supplying the milk co-op.
- Beef – taking beef animals from the herds and supplying feedlots and third party farmers/businesses (such as HoopBeef in Iowa). This is in direct contract to meat processor Tyson through their owned and managed feedlots.
- Feedstuffs – producing corn and other crops that can be used within the dairy business or sold/traded to third parties.
- Leisure – the Fair Oaks Farms (35,000 cows on 7 dairy units) is the biggest tourist attraction in Indiana.
- Genetics – producing dairy heifers for farm stocking and international sales.
- Farm sales – Tim has become highly regarded for growing dairy production in unlikely areas such as South Dakota, building turn-key operations for other investors.

Producing beef from the dairy herd is a relatively new concept in the US. The objective has been to improve the production and health of the dairy cows using health and genomics data whilst maintaining the returns per cow. Retaining dairy heifers from poor yielding, low fertility or unhealthy dams has been minimised through the use of sexed semen and beef bulls by AI/sweepers in the heifer cohorts.



Figure 55: growing dairy heifers and beef cross stock at about 150kg in an Amish rearing barn

An example of this is Black Sands Dairy in Iowa. Here 5,000 cows are milked 3x with only the top 25% of cows bred back to dairy genetics. Replacement heifers are bred to sexed semen. The rest of the stock are bred to beef – mostly Gelbvieh, but also some Angus or even Continental bulls. This results in 4,000 head of stock being produced for beef each year that are divided between HoopBeef and a local feedlot.



All the calves born at Black Sands move to dedicated rearers where dairy and beef stock are brought on together. This takes place in Michigan on around 250 Amish farms – where more than 150,000 head of stock can be reared at any one time – with payment based on the kilograms of gain per head. At 200kg the stock are divided and moved to dedicated heifer growing and breeding units – usually in Texas or Kansas – to return to the dairy of origin at 3-4 months pregnant, or to beef growers such as HoopBeef.

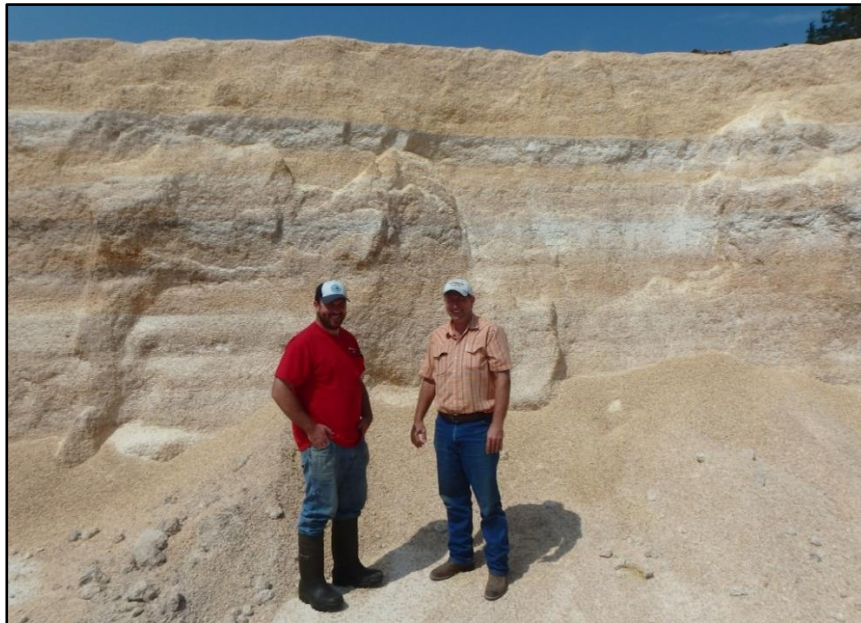


Figure 56: Den Dulk Dairies head vet Nial O'Boyle with feedlot owner Rob Winter in front of a clamp of grain maize

One example of how the integration model has been developed at this corporate level is Winters' Feedlot near Orange City, Iowa. Here 70,000 head of beef are finished each year with three partners supplying the feedlot: Rob Winters's own stock bought through backgrounding units in Wyoming, Den Dulk's (mixed black and white steers plus beef X steers and heifers) and Tyson Foods' the beef processor. The deal is that the cattle are traded firstly through the two local Tyson Food plants within 60 miles of the unit, and when a processor needs additional capacity then Rob Winter has to draw cattle to fulfil the orders.

Contract production of beef has been included in the portfolio of futures traded from the Chicago head office of AgBoss. Looking to maximise the potential of the business portfolio AgBoss manages the futures and commodities brokerage through the Chicago Mercantile Exchange. Sarina Sharp (daughter of Tim Den Dulk) works every morning at her computer and on the phone trading futures on milk, cheese, beef and the feedstuffs produced by, or needed for, the farms along with that for another 40 dairy units that cooperate with the business. This is agribusiness at the extreme end of farming and shows where "potential smoothing of the peaks and troughs of production can be managed," Sarina told me, "My job is to ensure we make profit each and every day. *More money can be made or lost in a day of trading than the farms may make in a week. Beef is traded forward to the processors and then I look at where we sit on the price and where it may be going to. If the market is moving up we may hedge forward, if then this looks to be realised we will take the price. It is a business management strategy that works for us and many other large scale producers.*"

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12.0. Discussion – is integration working for beef?

Dairy beef production is growing: rising demand at a global level has caused a steady increase in beef price, whilst a shortage of weaned beef animals has seen farmers move towards dairy-bred animals. This switch from a traditional, weaned, pure beef, calf has encouraged entrepreneurial farmers to adapt their system to include dairy-bred animals.

Outwith Europe, it seems, consumers largely understand integration exists within all types of food production. Despite what some NGOs may say, the majority of consumers do not regard scale as necessarily detrimental to animal health and welfare. Is this acceptance due to a lack of consumer understanding, or a willingness to accept that providing consistent cheap foods does mean larger farming enterprises? One example of consumer attitude to integrated farming practices would be the transport of animals: in the US, or even in New Zealand, large scale movement of animals across significant distances is regarded as normal within an efficient production system. How the UK public, let alone our NGOs, would view a similar system would be questionable.

One advantage dairy beef brings to beef producers is year-round calf supply. This has aided the integration process. The best operators have taken advantage of year-round calf supply in adapting a model often used in pigs: using separate farms for milk feeding to weaning, then growing on and finishing, to form a fully managed supply chain.

US integration looked to be most advanced, and with greater scale, than in other countries. Mass transport, over long distances, is nothing new in US agriculture. It already has a system where cattle are finished on feedlots based, mostly, in regions where the climate and availability of feed make outdoor management of cattle possible. For the likes of HoopBeef, or A-to-Z, integrating dairy calves into the beef supply chain does not seem to have created any public interest.

The scale of the beef industry in the US could be compared to Australia's. Feedlot finishing is common in both countries, where national demand for consistent and cheap beef has built an industry to supply the consumer. Whilst demand for beef in the US, and a contracting suckler herd, has encouraged the use of dairy-bred animals, in Australia the bobby calf is still all too common. With 2.4 million dairy cows, Australia could add a considerable volume of beef to its exports, alongside consistency and traceability, if the industry was to be so minded.

The US model of feedlot management, with pens of 100+ head on finish, allows best use of resource such as labour, targeting the cost per kilogram of gain. Using a cereals-based diet to finish cattle for a prolonged period of time, however, does not sit well with many external observers. Feeding by-product from bioethanol, and other industries, should be further investigated with many feedlots incorporating syrup and grains, but little or no forage, towards weight gain. Perhaps the fact ruminants can process green crops, unlike pigs and chickens, has been forgotten? There is a move towards "pasture fed" cattle in the US – and in the UK we need to take advantage of this ability when calculating diet costs for finishing cattle.

In New Zealand and Ireland the systems I witnessed were targeted to finish cattle with the minimum amount of bought-in feed. Breeding and group management are all used to target well grown, evenly finished cattle, at a young age from grazing. As an industry can we do more to reduce the requirement



for cereals, especially soya and first grade cereals, fed into cattle? We should be doing more to research grazing, weight gains and management techniques such as Techno-Grazing, in the growing and even finishing of cattle. Cover crops and managed, grazed forage crops, can save costs of housing and feeding plus have a potential to improve land use and soil fertility. The cost of each kilogram of gain should perhaps be the driver?



Figure S7: Dairy crossbred cattle on Link Farm, Fielding, New Zealand, graze forage rape as part of the Firstlight integrated business

Confined (housed) finishing is becoming more common in the US, unlike Australia and New Zealand. Matching much of Europe, the move to confined feedlots is to allow for year-round finishing, avoiding the impact of climate on winter feeding: some US researchers suggest improved daily liveweight gains of 25% due to reduced maintenance requirements and the impact of weather on feeding behaviour.

New nitrogen management legislation, and the value of slurry or manure to the arable industry, are also driving investment into confined finishing.

Smaller, backgrounding units work to add scale to the systems in Australia, New Zealand and the US. Taking batches of weaned calves and introducing the new management processes allows for smaller farms to contribute stock to the larger finishing farms. Backgrounding involves batching, vaccinations and diet change. For example in the US, before feeder cattle move on to the larger units of the Midwest, Texas and Nebraska, they are prepared for the change. This preparation helps reduce risk, improves welfare and maximises transport costs.



Figure 58: New 1,000 head finishing hoop being built in Minnesota as part of a 5,000-head all-dairy steer unit

Integrating dairy-born animals into a beef system involves one additional step, calf rearing to 200kg. Specialist rearing units have evolved to take in batches of young, 5-10 days old, calves to then manage these through to 200kg growing cattle that can move on up the supply chain. With dedicated staff and protocols for managing the very young calves, this system appears to work for the new integrated model. Low morbidity and mortality ensure these units produce healthy animals ready to continue through the supply chain.

Creating a dedicated supply chain, the farmers involved have been able to differentiate according to the stage they operate at: with dedicated feedstuffs, management programmes and even regional climate matched to the stage of the animals' life. Costs are minimised whilst efficiency is maximised.

Technology and management techniques

Utilising recording and monitoring tools developed via the web has become the norm for many of the integrated businesses I met with. From relatively small scale through to major producers like Agribeeff, the approach was the same: if you don't measure how can you manage?

In Australia the approach taken by Te Mania, using Sapien on the cloud, has shown farmers can work together. This approach monitors 60,000 head within Team Angus, and allows better sire and dam selections for traits, effectively accelerating EBVs. Having the right management system will be vital for an integrated model to succeed.

Electronic Identification (EID) was seen by many farmers as important to managing their livestock inventory. Recording treatments and preventions is commonplace in the UK, due to medicine



legislation, but monitoring the health traits for certain breeding lines alongside the same animals' genomics targeting healthier breeding lines is not. When traceability through EID, and cloud-based recording systems, are established, then assurance and consumer confidence can become easier for the integrated beef scheme.

"The chicken industry is consistently manipulating diet and management based on daily liveweight gains, measured often thousands of times a day. In the beef industry we take cattle and feed them hoping they grow. We need more science if we are to become more efficient producers."

Eric Reid, former Production Director, Moy Park

Weighing cattle to monitor production is increasing slowly on UK beef farms. Using EID and recording systems to utilise this data to then maximise nutrition programmes, even to sell underperforming cattle, was seen as the next step by Eric Reid (a former Production Director and driving force behind Moy Park Chicken, now undertaking a performance management review of beef in Northern Ireland). Using technology was seen by this pioneer as a way to improve returns from his beef finishing unit by maximising health and welfare of the cattle whilst pushing production to its maximum.

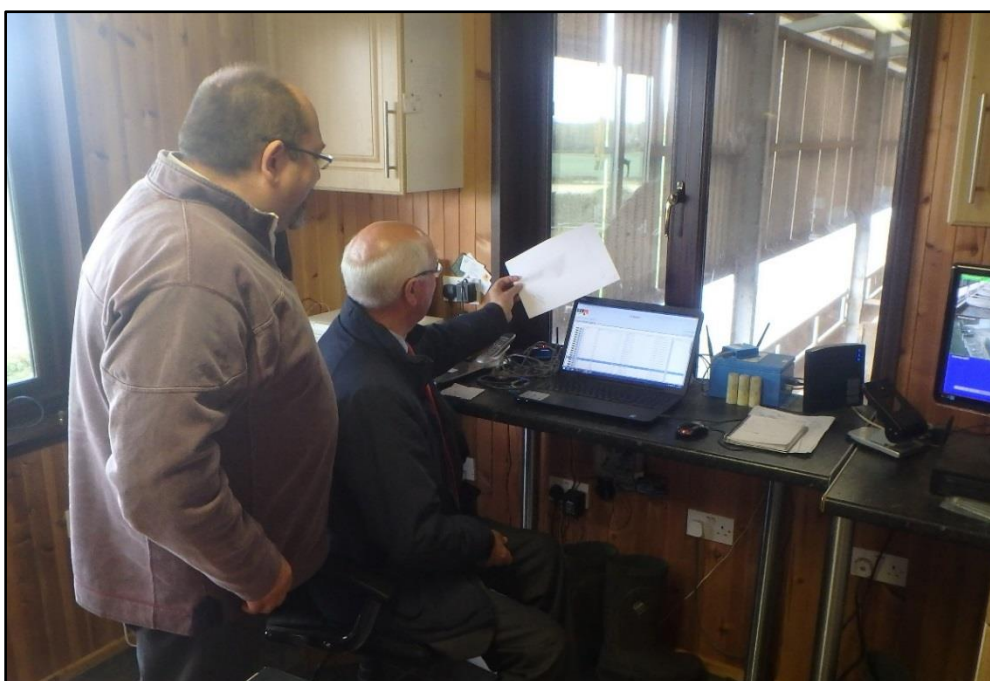


Figure 59: The author with Eric Reid at his beef unit near Dungannon, Northern Ireland, looking at his weight and cattle temperature monitoring system

Fever tags, and the intraruminal monitoring bolus are both examples of new technologies that I witnessed in action to help industrialise the rearing and production of beef. Monitoring health constantly and consistently will become vital in post-antibiotic farming. I saw fever tags being used in the US to monitor the temperature of finishing cattle. The tag is now on release in the UK, with trials being undertaken by the Royal Veterinary College to review its impact on calf health. Increasing the scale of production could be problematic with mixed source cattle: technology such as fever tag could



reduce disease and costs, whilst maximising efficiency. Could this be a topic for a future Nuffield Farming Scholarship?

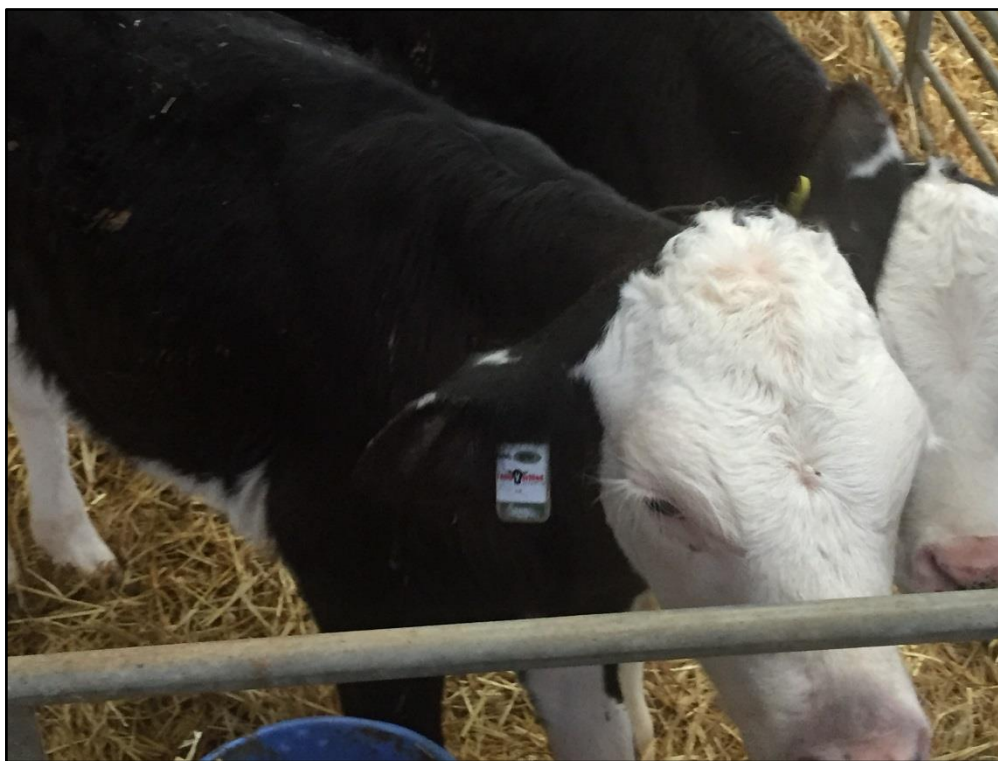


Figure 60: Fever tag in place monitoring the core temperature of a calf every 15 minutes and flashing to show when problems may be developing.

Genetics and adding value?



Of the integrated chains investigated the majority share common points. The most recurring was the integrator working with dairy producers to select genetics at farm level: ensuring integrator, processor and market have the product they all demand. When genetics were matched, and managed, to the end market it was evident the supply chain was benefiting from the additional value gained from the customer.

Breed-specific marketing was uncommon, other than Certified Black Angus or Wagyu. In the US, New Zealand and even Australia (in beef cows), the use of specific breeds through the crossbred calf, such as Wagyu, passed on higher pricing and value to the customer through better eating quality. I would argue in the UK we have breed-specific branding as a means to add value, such as Aberdeen Angus or Hereford, at the retailer level; but not necessarily meaning any better eating or consistency. The quality of the meat should be recognised and rewarded, not the breed; whilst using the correct breeding then conveys consistency of weight gain, feed conversion efficiency and finishing age. The brand is then reflected in the final product sold, where value is to be gained for the whole supply chain, not in the name of the bull used.



The most successful dairy beef schemes had recognised the dairy farmer was key to the system: not only in feeding colostrum or early calf management, but in getting the right calf into the chain. Paying a premium to the dairy farmer for the right calf genetics has created better integration. This effectively means the beef supply chain “rents a uterus” so the correct genetics are used. The integrator is contracting a calf from pre-breeding that suits the end market. This model offers the dairy farmer a very simple system, attracting forward-thinking producers to join the scheme where genetics and calf procurement are one and the same.

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- Deliver what their Breeding Values (EBVs) say
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Figure 61: The branding for Ezicalve in New Zealand shows what co-founder William Morrison is targeting – high quality, integrated beef production using Hereford bulls on dairy cows. (www.ezicalve.co.nz)

Examples of integrated breeding systems include:

- Ezicalve, Manawatu, New Zealand is an integrated Hereford beef system working alongside Silver Fearn (NZ processor) and with several large scale dairy businesses. In 2015 Ezicalve sold 250 high beef-EBVs bulls, with 220 going into dairy herds as sweeper bulls. A chain of calf rearers, growers and finishers has now developed to produce high quality beef for export. Demand is high from the dairy industry where maximising total output from the farm is seen as the main target in New Zealand.
- Dairy Beef Alliance, Victoria, Australia, (www.dairybeefalliance.com.au) has been working with dairy farmers and meat processors to develop a value-added chain using a specific Australian Black hybrid bull (3 way Wagyu with Angus) and cross breeding. The target for



2015-16 is to produce 25,000 head of Wagyu cross calves, with 10,000 calves from dairy farms and the rest as five-eighth Wagyu for export using first cross dairy cows.

- Blade Farming UK (www.blade-farming.com/) are part of ABP (Anglo Beef Processors) and have been integrating beef from dairy for nearly 15 years. Starting in the south west of England, Blade is now a national brand with rearing and finishing in England, Scotland and Wales. Blade will produce 25,000 dairy-bred calves in 2015, with more than 12,000 of these being Aberdeen Angus cross. Working with one food and drink industry partner (Mitchells & Butlers), Blade has a fully integrated supply chain from calf selection through to the restaurant, finishing 5,000 head in 2015.
- Blade Farming Ireland is also part of ABP and started integration in 2014 using calves from the Irish spring block-calving farms. The system aims to replace some of the 150,000 or so Irish beef cows that have been displaced by dairy expansion. The target for 2016 is to finish 2,500 head with studies being undertaken with Teagasc on the best genetics for grassland-based farming.

Branded schemes

Schemes for a single breed, such as Aberdeen Angus, can skew the marketplace. Although adding value to the calf at source, does a branded scheme add value to the beef producer or the consumer?

From what I saw in the US, having a Certified Black Angus scheme was creating demand for all black-coated cattle, not just Aberdeen Angus. The criteria for the scheme were based on the meat quality and having >50% black coat. This meant everything from very black Holsteins through to Black Simmental: even Wagyu were entering the food chain as CBA.

Following “horsegate” in the UK one company selling Angus has ensured every animal is DNA-tested prior to entering the dedicated supply chain. Integration can add value but also needs to ensure integrity at the same time.

In the UK, since Angus beef became “branded” at retailer level, a premium market has been created. Registration of Angus-bred calves has grown, and now represents the third most numerous breed after Holstein Friesian and Limousin. Is the eating experience any better for a name? Probably not.

Having an Angus branded scheme in the UK has lifted the price of the dairy crossbred calf from £100 in 2004 to £200 by 2014. *“A rising tide lifts all boats”* was one quote made by a major UK calf buyer when I asked what benefits to the processor, retailer and consumer an Angus animal brings compared to other breeds. *“The breadth of bulls and farming systems means we still have questionable consistency as the demand outstrips supply. Yet the producer is paid more for this beef”*, was another response.

In the UK any premium paid on an Angus carcass at the processor’s is all but negated by a similar rise in calf price. Is there any benefit to the beef producer finishing an Angus compared to a cheaper calf such as a Hereford cross or a straight dairy steer? In the US and Australia the carcass grading system ensures quality is paid for, not just conformation or breed, but rewards the producer and the genetics.



13.0. Conclusion: intensification not industrialisation

Conclusions

1. Scaled integration of beef produced from the dairy herd is possible within the UK.
2. Beef production needs to be differentiated at point of sale and the price should reflect the sourcing and the quality, not the breed of the animal:
 - Suckler beef – through the store process or an integrated model
 - Dairy-bred beef – through single farm, multiple farm or an integrated model
3. Consistency, quality and sustainability should be the key messages of integrated beef from the dairy herd.
4. The basics of integration are the same no matter the end product. Support will be required for farmers who set out to integrate: the change in mind-set, the production cycle and their farming operation will be considerable for some.

By 2050 the global demand for beef could be 42% more than was produced in 2014. This additional 25 million tonnes would match the volume increase seen between 1974 and 2014, although in the same 40-year period the global cow herd also rose by 25%. Could this production increase be repeated? Are there enough land or resources to feed enough cattle to meet the 2050 demand?

See chart on next page.

A further jump in cow numbers using yet more world resources would seem unlikely. Improving the efficiency of production and achieving more beef per cow calving or per head slaughtered, would be more feasible. Better management of production, including integrated models, has changed chicken and pork volumes dramatically. Therefore, taking an integrated approach to intensify beef farming seems possible.

But to follow the models of pig or poultry, the beef industry will need to cross many barriers.

Beef from the dairy herd – is integration the answer? ... by Robert Drysdale

A Nuffield Farming Scholarships Trust report ... generously sponsored by The Trehane Trust

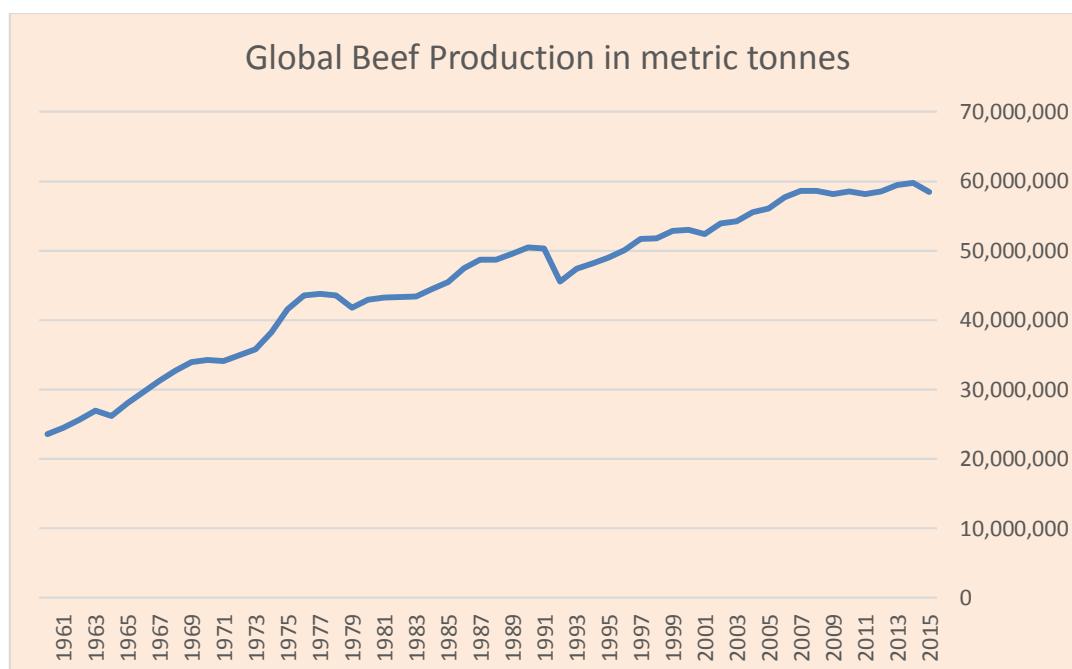


Figure 62: Global beef production has increased since 1960 levels, but to feed the expected population of 2050 an additional 42% is required. Can we do it?

Strategy is needed for growth: the integrator needs to plan ahead – scaling up brings opportunity but also problems. Several barriers to integration have been defined within a standard supply chain model. As beef integration involves a high value product and an extended timeline the process is easily impacted by some of these barriers. Appendix 1 (see end of this report) shows the barriers the author considers important to dairy beef integration for the UK.

There are already fully integrated supply chains producing beef. The majority use supply chain management to ensure a simple, yet cost-effective, production cycle. Many of these businesses involve dairy bred calves as the initial, inputted “raw material” to expand scale and production.

Beef has an elongated production cycle compared to other intensively reared meats: linking efficiency to cost of production is important in any integrated system. Age and feed conversion rate are inversely related, meaning the best integrators aimed to manage age-to-slaughter to maximise efficiency of production.

Although no supply chain would be seen as truly intensive or industrialised compared to chicken, the aim was still the cost per kilogram of gain compared to the final sale price. Increased numbers per group often led to a greater cost of gain across the group as inefficiencies at batch level became more pronounced.

Lean management should be the goal: a simple system that targets waste within the production cycle. Adopting lean management will allow integrated beef to flourish in a market place where the consumer wants value for money alongside quality, consistency and sustainability.

Maximising return per kilogram produced was seen by all the integrated beef chains as key to success – cost per kg of gain and overall selling price per kg were targeted for margin per kg.



Effective management of the supply chain will inevitably make the difference between success and failure. Growing an integrated system requires “sustainable intensification” through good management: consistent raw material, tight control of the farming process and producer margin. The aim is to match supply with consumer demands, consistency of output and eating quality.

UK beef

Do we need to increase UK beef production? Based on food security – yes. Can we increase production? Yes. The UK has the climate to grow grass and forage meaning we could grow more within a sustainable system. Some NGOs would suggest beef farming is using world resources that could be used to feed humans directly: ruminants can do something humans cannot when processing forage crops, turning these into meat protein. Making more of our own resources should be as important as scaling up production.

Can the UK increase beef production – what do we lack? Land, infrastructure, cow numbers to produce feeder cattle to finish and scale of finishing operations would be cited by most when comparing UK beef to other major beef producing countries. We do have some 1.9 million dairy calvings annually: from New Zealand to Estonia integrated systems exist that take calves seen as a by-product of the dairy industry and convert these into consistent and sustainable beef.

However, the cost of production is a major blocker for UK beef production. Time and again, meetings within the UK showed few farmers could define the real cost for each kilogram of beef sold off their unit. Outside the UK all the farmers interviewed knew their cost of production, whilst integrated producers often knew what the minimum futures price would be for their beef.

UK dairy farmers see beef crossbred calves as a valuable income stream, expecting a high price from calf rearers. Buying these crossbred dairy calves at the wrong price, within a protracted production cycle, could mean considerable losses for the rearers. As one beef farmer explained when looking at Aberdeen Angus crossbred calves: “*you can buy gold too dear*”. The final selling price for any Aberdeen Angus cross or purebred is often £0.30/kg higher than conventional beef giving a premium of £90 on a 300kg carcass. This though is from a calf that could have been £100 to £150 more to purchase from the dairy: an unsustainable process.

Specifically, can we “chickenise” beef production in the UK? Yes. Not, though, on the scale the author witnessed in other countries. British farmers already use dairy beef, with at least 45% of prime beef from this source; however the efficiency and consistency of the production cycle can be improved.

My view is we can be a lot more efficient within the supply chain, and with an integrated planning approach, an increase in home grown beef would be a reality.

Is there more demand for mass produced meats: the population may be divided by the actions of NGOs such as Compassion in World Farming but the call for affordable and sustainable meats has made the intensification of production more common. Retailers have a duty of care to the public and also to the primary producers to ensure a viable food industry in the UK following farm assurance and welfare standards that meet public expectations. At what cost?



Differentiation is needed: dairy and single suckled beef are two different products. The higher production cost and system sustainability of suckled beef must be reflected in a higher farm gate price, and passed on through the chain to the consumer. But where does native breed, crossbred dairy beef such as Aberdeen Angus or Hereford fit in that same payment grid?

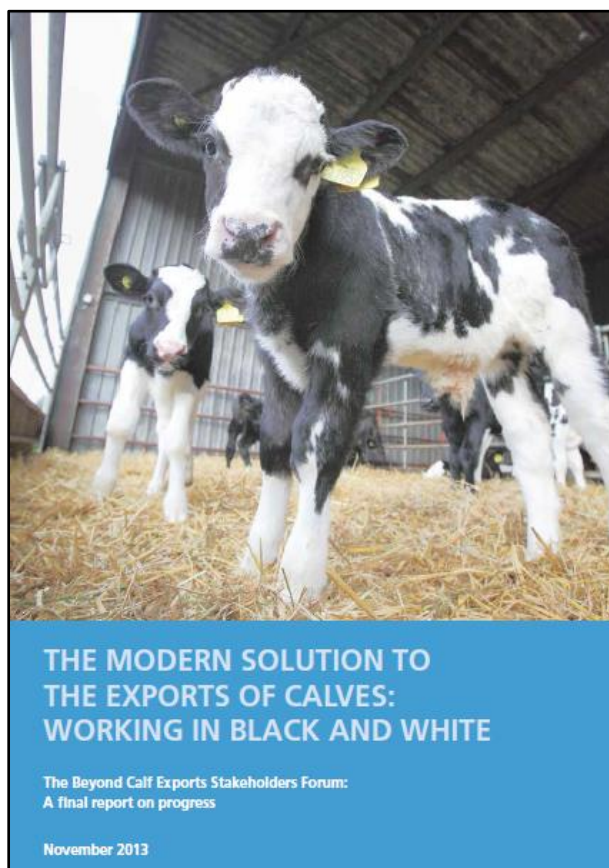


Figure 63: A cross-industry body, Beyond Calf Export Forum, was formed in 2008 and produced its final report in 2013. The forum aimed to improve dairy bull calf use within the UK including Compassion in World Farming and the RSPCA alongside retailers, processors, levy boards and others. (www.calfforum.org.uk)

Packing and selling beef – what can we learn from chicken?

With so much meat sold in retail packs, the producer who hits the specification consistently should be rewarded. In the poultry industry growing chicken is monitored on a daily basis, with hybrid strain and feed selected to maximise return on the system used. Feed conversion may appear to be the Holy Grail for chicken integration, but growing to the specification is the number one target. Missing specification in chicken, even by 20gm/bird, can mean huge costs to the producer, and even penalties from the retailer.

Processing can also be impacted by out-of-specification birds. Following a bird from collection to packing entails a significant number of steps where the wrong size/weight of bird can have a negative effect. The modern plant is highly mechanised to reduce labour costs and speed up production. In much of the world similar automation and mechanisation is being introduced to red meat lines, and



whilst this may be possible for lamb in the UK, the variability of incoming cattle makes this very difficult to achieve.

Chicken production efficiency and consistency follows through to boning, packing and even the retail shelf. The pack size, weight, meat colour, shape of cut and ultimately price, are all considered by the integrator and retailer. Meat and eating quality are taken as a standard achieved by integrators, through tasting and testing panels, and routine quality checks, are common to ensure consistency. The target specification for the bird filters through to each of the points.

Uniformity of carcasses supplied to UK abattoirs is hard to find, and this is unfortunately reflected on the beef in the retailer chillers. When looking at the food industry steak size, meat texture, marbling and cost all matter to the restaurant or caterer, with imported beef routinely meeting a high level of consistency for all these criteria, meaning UK beef is rarely used.

When looking at the food industry where consistency of the steak size and cut, consistency of the meat texture, and colour are all important, imported beef routinely meets a high level of consistency: hence its routine use in the restaurant and catering trade.

Meat grading and selling to the consumer

People buy with their eyes, and from previous eating experience. In Canada, the USA and Australia it was clear the supermarket consumer was attracted to beef sold by eating grade and consistent size of steak: well marbled, well coloured and with tenderness. When eating out, restaurants in these same countries had the menu labelled to show the meat quality grade alongside the cut. Both instances meant the consumer would be fully aware of the quality of beef that was being purchased

As an example: packages of steak in the USA are sold with the quality mark plainly evident allowing the consumer to make an educated purchase. Other than where specific branding is used - such as Wagyu - the only other obvious scheme available to US consumers was CBA (Certified Black Angus) although neither true traceability nor any level of integration was evident by that branding. Quality of beef by USDA carcass grade, and the “breed” was used to sell the product to the consumer. Quality was assured to the purchaser when buying *prime* or *choice* for home consumption or in a restaurant. A similar system for grading has been recommended previously by other Nuffield Farming Scholars. Education of the consumer to the qualities of the beef they are buying cannot be through breed alone. Retailer schemes such as Aberdeen Angus or Hereford can have highly variable meat quality.

Carcass specification and grading – where the farmer, industry and consumer will all benefit

The UK beef industry relies on multiple farmers supplying cattle each day to the processing plant, often in small loads. These cattle are finished as the farmer sees fit, within their own individual system. Historically we do not produce for the market we supply: farmers are audited and rewarded based on welfare, traceability, breed and age, not the quality or consistency of the meat.

The EUROP carcass grading system pays the producer for conformation and fat cover. Weight then multiplies the carcass price often meaning farmers chase heavy weight cattle over consistency and



eating quality. Large carcasses may pay the producer but does the processor benefit from all the additional beef or the size of primal cuts?

For an integrated system to succeed in the UK, value to the processor would need to be recognised, through consistency of supply and quality of the meat. Would a processor be willing to reward a producer that takes this approach? More importantly would the retailers or food service industry be willing to pay for a more consistent product?

Processors are also to blame for the current UK beef system. When asked: “*what cattle would you like at what specification?*” few I interviewed had anything to suggest other than a size of carcass and grade of meat. Outwith the UK it seems most farmers that I met, even those not integrating, knew exactly what the meat processor expected of the animals they were consigning for slaughter.

What makes integration work for beef production?

Common points noted across many of the integrated businesses I met included:

- A positive attitude by producer and processor to the supply chain.
- A targeted production process to the specific market.
- Those who work both back and forwards to integrate were most likely to succeed.
- The recognition that quality and consistency of production is key.
- Investment from external capital sources allows for scale and replication of production units.
- Direct management of raw material supply, the dairy calf, was vital for success.
- A cooperative approach to the breeding and genetics, with a value-offering to the dairy farmer producing the calf, giving a genuine income stream.
- Scale came through the business as a whole, not at an individual farm level.
- Margin expectation needs to be managed at all levels of the chain – meaning transparency of costs and returns, from calf producer through to beef processing to the retailer.



14.0. Recommendations

The UK beef price is amongst the highest across the globe, yet for many the cost of production compared to return is unsustainable. How can UK beef producers compete? Dairy beef already plays a large part in the UK supply chain and integration would allow reduction in the cost of production - but at what cost to the suckler cow industry and farmers?

1. Formation of “UK Beef Council”

Education and marketing to the consumer of the provenance and nutritional benefits of UK beef is needed at a concerted level. The formation of a UK Beef Council, similar to the UK Dairy Council, would mean a singular working group of stakeholders working together on promotion to the consumer of beef. The National Beef Association does not represent the whole industry from producers to processors and retailers.

The UK Dairy Council website is www.milk.co.uk and it says a lot about the fragmented beef industry that the domain www.beef.co.uk is available to purchase. Without a centrally managed group working on behalf of beef to the consumer, the public at large and NGOs, there is a distinct lack of cohesion, management and direction on promotion, support or response to inaccurate or unfair publicity.

2. Creation of a brand for quality and integration within the supply chain

Additional income to the producer has been created by some of the major retailers on milk or breed specific red meat supply chains. In an effort to ring fence their own requirements whilst showing their customer base they support British farmers a premium above the market price is paid that may or may not be passed on to the consumer.

Integrated beef would enable supply chains to be audited for lifetime assurance, consistency and quality, thus attracting a premium from the purchaser of the beef produced. This could be simply “100% dairy bred British beef” through to higher welfare or production marques such as Freedom Food or LEAF. Looking further ahead brands such as being seen in the US of “antibiotic free” should be feasible?”

Developing supply chain recognition through the retailer buying team would offer a sustainable solution to dairy beef by adding a minimal premium to this integrated beef at the point of sale, and passing this back to the producer, would be simple and effective. A producer bonus, as is seen currently for Aberdeen Angus or Hereford beef through several UK retailers, attributable to animals fitting the tighter specification required for that particular retailer and scheme.

3. The price of mince needs to reflect the work and costs associated with beef production

Beef sales are reducing at the retailer level. Shoppers at the retailer level are still willing to buy beef, choosing more convenience cuts or more often mince. The base price for minced beef effectively devalues the rest of the carcass balance at the processor, and then back to the producer.



4. Consumer education

The consumer ultimately makes the final decision to eat beef or not. Education, as has taken place in the USA, Canada and Australia, of what good beef is really all about would give the consumer confidence to purchase, cook and eat it. The retailers, and UK beef industry, should not be afraid to show what the farmers provide in addition to simply the meat in the pack. Beef needs to be seen in the same light by consumers as free range versus broiler chicken, or outdoor-reared organic pork compared to standard indoor intensive pork. Education would then lead to differentiation at point of sale.

5. Differentiation of beef by production source

Identification of the beef supply chain would offer consumer choice. Having the price point dictated more by the quality, sourcing and production method rather than breed would help contribute to sustainability at multiple levels. The price returned to the producer would then reflect the cost of production: promoting the difference between suckler beef and its often upland or less-favoured-area production with associated costs compared to more intensive, yet still assured, dairy beef.

6. Food and service industry

The food industry adds value to beef, from mince and burger to steaks and roastings. Choosing to use imported beef ahead of British means any potential gain to producers through dedicated supply chains or even carcass balance via meat processors is lost. Meat processors in the UK have been slow to move on to supplying the food industry, where added inputs would be required compared to working with retailers. The levy board and processors should be looking more to the food industry where there is real potential to gain margin across the whole supply chain.

Targeted production aimed at the food industry is needed. Multiple small/niche supply chains already exist within this sector; however there is potential for large scale, integrated production to increase beef sales to the food industry. The scale needed will require facilitation throughout the beef industry in order to succeed.

7. Recognition of purebred dairy beef by retailers

Black and white dairy bulls and steers are in reality persecuted by retailers, effectively devaluing them within the supply chain. Until the quality and consistency of purebred dairy beef is recognised by the retailer, calf values will continue to be skewed. Crossbred calves from dairy are overpriced compared to the final carcass price whilst purebred beef is penalised. The levy board should produce a body of research, using up-to-date feeding and management techniques, followed by modern processing and carcass management, to prove or disprove purebred dairy beef is a quality product.

The retailers have a duty of care to black and white bull calves. The punitive devaluation of the beef produced through the processors due to a perceived lack of quality or taste must stop: this attitude actually flies in the face of the retailer dairy supplier policies in many instances. Processors are being given specification guides based on the breed, not the carcass or meat quality, despite these same retailers telling their dairy producers not to shoot or export their purebred dairy bull calves. This system smacks of double standards.



Integration will benefit greatly from retailer support on purebred dairy beef. Looking at future production levels, forward pricing agreements and contracted production of consistent eating quality and supply, with lifetime assurance and no market trading, is all possible. Integrated retailer supply chains using good numbers of purebred dairy bulls or steers with scale would be easy to construct, expanding on the several calf rearing companies that already work in the sector.

8. Metrics to calculate

Production should be considered as a daily cost for beef farmers. If the beef industry is to improve returns, then sustainable production is vital: integration within a supply chain means understanding each cost with Lean Management processes then employed to reduce waste and improve potential margin. Many UK beef producers would benefit from a review of their farming systems when capital invested is set against returns.

Simple metrics are needed for this comparison to be undertaken:

- **Cost per Kilogram Liveweight Gain** or £/kgLWG can be measured for any portion of dairy beef production from calf rearer to finisher. Many farmers use Daily Liveweight Gain (DLWG) as a measure of feed conversion efficiency but this does not include any costs or total feed intake. By attaching the actual cost per day – including all costs from feed, housing and management – to each kilogram gained would show the true cost of gain.
- **Cost per Kilogram Deadweight** is not a common measure employed by beef farmers or consultants. Every beef finisher should know returns for each animal consigned but what did that animal really cost in terms of the kilogram of beef sold to the processor?
- **Daily Deadweight Gain** can be calculated from arrival weight on the farm and number of days on the unit using a kill-out percentage. This is indicative of the true performance of the animal on the farm.
- **Lifetime Daily Deadweight Gain** using date of birth and applying birthweight according to breed. On a fully integrated system lifetime feed usage can be calculated to then look at feed conversion rates. Age at slaughter will impact this metric as feed conversion efficiency is related to age. The carbon footprint per kilogram of beef from this carcass, and greenhouse gas emissions, are also linked to the age at slaughter versus carcass weight.

9. Data and analysis

Beef farmers need to understand the market they are producing for: the aim should be to maximise the return for each and every animal produced. AHDB statistics suggest more than 50% of carcass processed in 2015 failed to meet specification. This represents a significant loss of revenue to the farmer and the industry, plus waste in the supply chain when sustainability is being questioned. More beef finishers should apply true costs of production against the return.

The data exists within the MLC and processing chain to allow for better feedback to the farmer, and the levy board should facilitate this by:

1. Using national MLC data to allow weekly production data to be published for producers to compare their performance. Data already exists for breed, sex, age and weight plus carcass



- gradings. It would be relatively simple to then calculate key performance indicators as base level metrics for the industry to aim to improve.
2. Publishing not only the spread of R4L prices across the country but also by breed schemes, processors, and actual price paid, plus showing regional variations. This would encourage more competition in the industry. Change would then be driven by the industry towards the markets available: not as it currently stands to supply the local processor. This would be an expansion of the new “spread of R4L base price” that is being reported: effectively naming and shaming processors who take advantage of local market and their grids to reduce the prices paid for quality, not just out-of-specification beef.
 3. Reporting quarterly, within the current levy payer newsletter, greater analysis and benchmarking of animals processed. This should include breed, age, sex and weight bandings with price paid, and showing comparison of processor grids. Such a report would aid the beef farmer to compare returns and processors at a national level and with their peers.
 4. Creating an online, free-to-access as part of the levy fee, tool for all beef finishers. Using MLC and processor data, including producer kill sheets and national reporting, for:
 - Calculation of actual-versus-target carcass/specification for that producer against a certain scheme or the standard processor R4L price that day. This would allow the finisher to understand any lost or gained “value” for each animal processed.
 - Calculation of metrics allowing beef producers to have benchmarks produced such as lifetime daily liveweight gain, daily deadweight gain etc.
 - Deviations of industry number on the same benchmarks for best and worst groups. Similar comparisons are used by dairy and chicken producers when benchmarking key performance data with real benefit often seen at farm level through this analysis.

10. Education – from college to levy board

Investment in education should be considered at all levels of the beef supply chain. Farmers need to understand the cost of each kilogram of beef, youngstock reared, or animal produced by their farm. Cost per kilogram of liveweight gain should become one of the standard metrics benchmarked. Only by having a real grasp on costs associated with their own system can beef farmers make informed decision such as future investment in buildings or land, or even simply purchasing stock.

- Education within the beef and agricultural industry needs to be developed towards economics of production and the system costs. Agricultural students should receive education in standard systems of beef production, with emphasis placed on economics, within their course.
- Consultants should be encouraged to calculate costs of production against returns for their beef farmer clients. Business reviews should become a standard part of each annual review for any farmer with bank borrowing or looking to borrow against their beef business.
- Levy boards should be developing greater one-to-one education methods on farming economics for all beef levy payers. This is a large part of the levy system in New Zealand; why not in the UK?
- Global beef price per kilogram should be published within the levy board newsletter. The foreign exchange rate impacts UK beef producers; however, the same could be said for other countries at a global level.



11. Retained ownership and growth models

Contract feeding is common practice in other countries. The passport system for animal identification means retained ownership is impossible without agreement between processor and beef finisher. This is stifling expansion and scale for many beef finishers where capital to own the cattle is limited, yet they have the ability to feed and manage larger numbers of cattle. Integration is complicated currently by the passport system: the RPA and DEFRA, through BCMS, need to change the system for passport identification to allow for retained ownership yet showing the units the cattle are kept on.

Investment in beef cattle from external sources has allowed growth and scale in many instances. Retained ownership would encourage external investment into farming – bringing new forms of lending and capital into an industry that wants to grow. Farmers should not be afraid to work with alternative lenders to scale their business and develop within supply chains.

The levy board should be researching capital investment and economics models for beef production. This would also help develop resilience within the beef industry and sustainability within the supply chain for the future.

12. Meat processors and carcass grading

EUROP carcass grading can be punitive to dairy beef. Quality and consistency should be rewarded with producers encouraged to develop new supply chains utilising dairy beef. Consistent supply of beef with same quality: meat colour, texture, tenderness, cut size, intramuscular fat deposits, fat cover and colour should be rewarded. More modern methods for carcass grading need to be introduced that recognise beef quality and meat yield.

The processing industry payment grids encourage the store cattle industry, where often excessive prices are paid for cattle that will struggle to finish within a budget that produces any margin to the farmer. The EUROP grid means, effectively, conformation is targeted, producing large cuts of meat that are difficult to manage within the retailer supply chain; and actually means the processors lose margin with these animals. The R4L carcass is perfect as a base; however, meat tenderness and fat should also be recognised.

13. Realignment of the beef trade

Meat quality should be compensated for, not just the breed or the weight. A sustainable price for both the primary producer and the beef farmer should be encouraged. The current system sees the breed and final buyer of the animal often considered above the quality of the calf let alone the final market price. The store trade also creates an unsustainable market place, especially when comparing the UK market to other beef producing countries where a reasonable and fair margin is expected across all sectors of the beef chain.



15.0. After my studies – what did all this mean for me?

“The single biggest problem in communication is the illusion that it has taken place”

George Bernard Shaw

What did the Nuffield Farming Scholarship mean to me? Nuffield Farming opened doors, allowed me to meet business people involved in farming and integration around the world, and to really delve into their businesses, models and ideas. The UK represents only a tiny fraction of global beef, with, generally, a very conservative approach to how it is produced. Experiences gained from my travels have encouraged me to take on the next chapter in my own life: since returning from the USA in July 2014 my aim has been a career in the food industry, swapping the role of a farm vet to become a beef producer and integrator.

New project – an integrated beef company

This is starting a partnership with my wife to integrate beef from local dairy farms in the South East. Taking my cue from the many businesses I was privileged to meet through my travels, and with the input of several fellow 2014 Nuffield Farming Scholars, we are targeting high quality, branded beef specifically for a retailer scheme.

In December 2015 our first animals were processed. This first consignment was the start of an ongoing programme: with rearing, growing and finishing all working to produce a healthy, well grown animal within a tight specification for the processor, looking to meet specific customers’ needs. Over 2016 throughput will build from 20 to 60 head per month.

Phase One began in August 2014. The first cohort of 60 Hereford cross calves, born on local dairy units, was placed on two Sussex farms for rearing. Once weaned, and grown on to 110kg, the calves moved through the supply chain to grow on to >450kg over the next 12 months. Their final move was to a specialist beef finisher for custom feeding through to slaughter.



Figure 64: The author with his integrated team of calf procurement, rearer, grower and finisher

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A Nuffield Farming Scholarships Trust report ... generously sponsored by The Trehane Trust



Phase Two started in October 2014: working to further develop the supply chain with a dedicated, managed genetic programme. Integrating at the source of the calf (the dairy farmer), a number of pregnancies have effectively been contracted using artificial insemination or placed breeding bulls that fit with the goals of the scheme. Initially, 600+ pregnancies have been established through Surrey, Sussex and Hampshire dairy farmers with the first calves collected in August 2015. This approach, with calves bred specifically for the target market, should ensure healthy, good quality of the raw material to the rearing units, with consistency of finished product the target.



Figure 65: A batch of weaned Hereford cross and dairy bred bull calves

The beef futures market in the US, and the production supply contracts I saw in Canada and New Zealand, create a working market for suppliers and processors, effectively allowing integrated models to develop.

For integration to work within the UK beef market, it was important that some form of contract, including a futures element, was replicated here – that meant working directly with an abattoir. A trial is in place involving both future supply and a market price element where the farmer/producer is linked to the end user to secure numbers for the processor. Looking to the future the contract will roll in 15-month segments. This arrangement, with a portion of production contracted, has reduced the risk level to the new business and has allowed me to take a longer term view whilst the model builds.

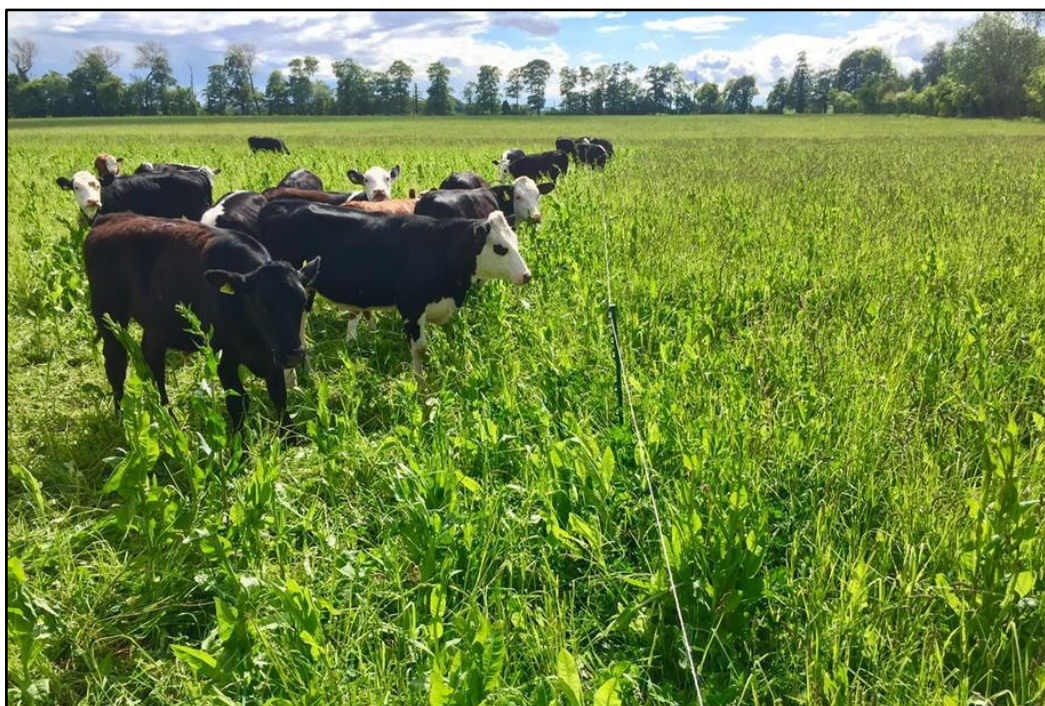


Figure 66: A batch of beef calves in a techno-grazing system on arable land in Cambridgeshire

Phase Three will look for external investment towards business expansion. In both New Zealand (through My Farm and Westview Farming Partnership) and the USA (with AgBoss and HoopBeef) capital to develop these models was introduced from outside farming. Using private finance rather than institutional sources may offer a less traditional route to capital with a less restricted view on risk and return. The capital required to produce any scale without land for security, it seems, is beyond the understanding and risk levels of most agricultural bank managers.

And what about after the Nuffield Farming Scholarship?

I was aware when submitting my application that one of the key drivers to Nuffield Farming is knowledge transfer. After 20 years working as a farm vet I am used to speaking to groups of farmers; however, being asked to speak as a Nuffield Farming Scholar presents a new challenge.

At the time of writing I have presented my initial findings to my sponsor, the Trehane Trust, spoken at The Livestock Event for the RABDF on my study topic and reported to the Nuffield Farming Conference in Belfast. Dates in my diary already include two conferences and several Grassland Society meetings.

In March 2015 I started to work with Wynnstay Farming PLC. Since then I have been developing beef projects alongside their technical team aimed at benefiting their farming customers. In August, Welshpool Market hosted the first ever Wynnstay Beef & Lamb Day – with over 500 farmers attending the event.

See photo on next page



Figure 67: The author presenting to group of beef farmers at Welshpool Market, August 2015

It is good to be able to offer something back to farming after 20 years of working within the industry. I have always looked to revolutionise the way farmers see their relationship with the vet, and now the next chapter of my life will, I hope, be revolutionary within the beef supply chain.

Robert Drysdale



16.0. Acknowledgements

*“One of the deep secrets of life is that all that is really worth doing
is what we do for others” Lewis Carroll*

What did I learn? Undertaking a Nuffield Farming Scholarship was a life changing event for me. Without so many of the people I met, my travels, learning and overall recommendations would not have been possible. There are many more I am sure I will have forgotten to mention.

Firstly, I would like to thank my wonderful, and longsuffering wife, **Bonnie**. Thank you for letting me take so much time away from home both physically and mentally over the past two years. I know I am not easy to live with at the best of times, but having someone constantly thinking about his next travels or latest findings instead of helping out around the house must have been torture. My work has been at the centre of our lives for the last fifteen years; now is the chance to put our future first!

The Trehane Trust: why would a dairy trust offer a place to a vet wanting to look at beef production? However, I would like to thank the Trehane Trustees, and Scholars, who have supported and championed my project. I feel very privileged to be not only a Nuffield Farming but also a Trehane Scholar, and can only hope I will repay, via the UK dairying industry, the trust both bodies have shown in me.

My clients, and vet team, at Westpoint. With so much time away, often a month at a time, some of the farmers I work with must have felt I had retired! Many of my best friends are also my clients, and I would cite the input and opinions of these farmers as one reason why my Scholarship topic was to be beef from the dairy herd. Thank you especially to Bill Westnedge: without your kind words and steady support I doubt Westpoint would exist let alone this Nuffield Farming Scholarship report.

Travelling round the world takes support from others: I am lucky enough to have built up a network of friends over the years who helped me. Now, following my Nuffield Farming travels, I have a good deal more friends. The list below is not exhaustive, if I have left you out please accept my apologies!

Australia: Jim Lloyd, Tom & Lucy Gubbins, Emma Germano, Rob Cumine, Jake Follett

Canada: Juli Badia Guillaumes, Dr Marty Barrow.

Estonia: Sivar Irval, Aadi Remmick, Raul Petson.

Ireland: Tommy Moyles, Jonathan Birnie, Paul Mathews, James Hickey, Gary Fitzpatrick.

New Zealand: Mel Poulton, Gerard Hickey, Richard & Sue Redmayne, Shane Carroll, Nicola Shadbolt.

UK: Richard Phelps, Adam Quinney, Andrew Chitty, Michelle Waterman, Dr Mary Vickers.

USA: Mike Brown, Nial O’Boyle, Sarina Sharp, Brady Revels, Karl Den Dulk, Jay Theiler.

Twitter: Craig & Rachel Dettling, Brian Corr, Zoe Vogel.

Finally I would like to dedicate this to **my parents** – as it was their encouragement, in my early years, that made me the man I am today. Success and money may come and go, but your family is with you always.



Appendix 1: Barriers to integration of dairy beef

Looking at integrated beef the following points need to be addressed:

1. Supply of raw material – intensification of livestock production relies on the throughput of stock. Integration, such as in the motoring industry, allows for strategic supply of components. When considering livestock production there needs to be:
 - a. Consistency of supply – the multipliers in pig and poultry work with precision to produce young animals to take on to grow and finish on a daily basis. Batch supply has allowed growing and finishing units to specialise, with dedicated staff, buildings and processes. To finish cattle effectively will require scale and investment, meaning consistency of grown cattle in batches to allow maximal throughput against capital invested.
 - b. Reliability of numbers – introduction of a multiplier, hatchery and broiler unit model revolutionised poultry meat production. This meant economies of scale to the integrator, reducing price and supply to the consumer. Specialist farmers with the dedicated aim to supply weaned calves in batches will enable contract production within a supply chain.
2. Quality of the raw material – in the case of livestock production, the health and genetic potential of the animal to be finished. Batch management that includes nutrition and vaccination programmes should ensure healthy stock. Added efficiency for beef production will come from improved genetics, specifically traits for feed conversion and health. Having a contract between dairy farmers and the integrator would maximise input of calves that fit the model. Pig and poultry breeding is continuously looking to improve performance, to maximise output vs costs of the system.
3. Scale of operation – increasing the speed of a production line means reduced unit costs. Increasing production speed can lead to quality control issues with human error - from lack of experience or training in the production process - often cited as problem areas. To integrate beef:
 - a. Management will need to follow scale to ensure good production.
 - b. Monitoring will be required including EID and recording systems to manage large numbers.
 - c. Mechanisation of simple processes such as milk feeding or bedding needs to be introduced to allow more livestock units per man.
4. Capital required – the value of each livestock unit must be considered when integrating production. A day-old chicken is relatively cheap compared to a calf. The capital sums to scale beef would be considerable. To integrate beef and take advantage of scale usually means external investment of some form.
5. Impact of timeline on funding – the extended time to finish beef compared to pork or chicken means a longer investment period. Adding time to the process increases risk of morbidity and mortality. The risk of losing an entire broiler shed to disease could be high but the cost compared



to a shed of finishing cattle would be much less. Comparing the return per square metre for a finishing shed could be very similar when the total days are considered. Cost per kilogram of gain should be considered as a model for beef.

6. Management costs – integrating beef will require additional management with associated costs. Spreading the cost of management over the livestock numbers that can be overseen by one member of staff suggests the bigger the animal, and longer to finish, the greater the relative cost per head. Funding for staff costs would need to be considered.
7. Transportation costs – mass transit of young and finished poultry, compared to the same weight of cattle means greater associated unit costs. Limitations on weight of vehicles and distance for transport to processing could also add cost to producers. Finishing sites' geographic location is important for feed availability and production, but long distance haulage could see any savings wiped out. The best integrators in the US have their own transport teams to reduce costs.
8. Quality assurance – concerns over mass production of livestock could be a barrier to scale of the system. Auditing and management of welfare is important to the consumer. An integrated model would simplify lifetime assurance, whilst scale will facilitate the auditing process. Retailer, and NGOs, will be welcome to monitor integrated beef systems: larger units have high levels of management and staff training to ensure best practice.
9. Public perception – perceived welfare and food quality standards should be more easily managed within an integrated system. Single ownership with monitoring and management protocols should reduce the need for medication, prophylactic or otherwise, with targeted health programmes and optimal nutrition to reduce stress and disease.