New Zealand Nuffield Farming Scholars Association

2005 SCHOLARSHIP REPORT

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"To innovate is difficult, but without innovation, a company cannot succeed"

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1 Executive Summary

The quality of our NZ economy depends on our ability to acquire, protect, translate, combine and apply knowledge. This knowledge is required to solve today's problems and to prepare the ground for solving tomorrow's. Without new knowledge, and new combinations of knowledge, there will be no innovation. And without innovation, NZ will struggle to keep pace with our competitors.

These tenets apply to any country aspiring to maintain its place as a 1st world economy. But they particularly apply to an agricultural sector that currently supports 17% of our economy. The future of an untended NZ agriculture is well signposted amongst other western societies; commodity producers struggling for profitability and shrinking in importance.

The alternate and more attractive, yet 'difficult-to-achieve', approach is for NZ Agriculture to embrace innovation to reduce our costs of production, to improve the efficiencies of processing, and to add value and profit to our products. It is this latter point; applying innovation management to add value to food products that was the focus of this study.

Innovation management is about combining the concepts of innovation (creativity, speed and change) and management (planning, organising, monitoring and control). In the context of this report, it is about the question "can we improve the conversion of R&D spend into profitable products?"

The method used to answer this question involved case study visits to world class food companies in Europe, the UK, the United States and Japan. It also included visits to universities and learning institutions to understand their role in promoting innovation. Finding small and medium food enterprises proved to be problematic; start-up and small innovative companies from a range of sectors were utilised.

Each of these case studies provided the following insights regarding the key factors for successful innovation management:

⇒ To *innovate requires investment* and by most measures NZ under-invests. Successful FMCG[1] companies such as Nestlé and Kraft are spending approximately 1.2 – 1.4% of sales on R&D, ingredient companies typically spend 0.7 – 0.9% of sales on R&D. By comparison, Fonterra (NZ's largest private investor in R&D) spends 0.8% of sales on innovation. Nationally, our R&D spend is approximately half of the OECD average and government research expenditure in the agricultural sector has fallen since the early 1990's.

⇒ Successful innovation needs to be targeted by a *clear vision and business strategy.* New Zealand is competing against world-class food conglomerates so our vision and strategy must focus the scope of our aspirations and must match our key competencies with market requirements. Bernard Matthews, a vertically integrated meat company now 'owns' the UK frozen lamb category through an absolute alignment of the company activities with the market.

⇒ Successful innovation requires a *constancy of purpose.* Danone, a French Company, has set out to dominate the fresh dairy category through focusing on

[1] Fast Moving Consumer Goods

active health, nutrition, customer preference and technology. After more than 20 years of resolute effort, they have overtaken the giant, Nestlé, as the category leader in most of their markets.

⇒ There must be a supporting *innovation culture*, such as that displayed within Kerry Group's strategic business units. Staff must be encouraged to innovate; rewarding success must be balanced by understanding failure, and both internal and external networks must be fostered.

⇒ Whilst business structure doesn't appear to be critical, most successful food businesses have a centralised Research facility with *supporting in-market product development centres*. Although NZ is a good location for Research, our development activities may be better placed off-shore. The lack of NZ development activity for lamb in the UK market was noticeable.

⇒ *Intelligence* – including the orderly gathering, processing and use of information is critical to determine the most profitable areas of development. Bernard Matthews uses store sales and market research to drive product development.

⇒ *Strong links into the market*. There are real tensions between technology push and market pull – and in NZ we are dominated by 'push'. Innovation that isn't linked to real market requirements will fail. Unilever, a multinational food and consumer products company displays excellence in this regard.

⇒ *Innovation tools* that result in a superior conversion of R&D spend into profitable process improvements, products or services. The best companies have clear criteria for saying 'No' to projects at all stages of their development. By cutting failing projects we have more resources available for the projects that are most likely to succeed.

⇒ *Managing the skill base* – addressing issues such as the recruitment and retention of people with the needed conceptual and scientific or technical skills, or of accessing those skills externally. Most of the companies studied, as leaders in their field, had strong resource recruitment and retention capabilities.

In addition to the large company case studies, innovation in a small and medium sized firm (SME) context was studied. SMEs suffer from a lack of finance, capability and capacity in applying the innovation process. Successful SMEs have a clear and limited vision, a good understanding of the path to commercialisation, can access good business acumen and can secure funding from a range of angel or venture capital sources.

Whilst the detail of this report was focused on innovation, the Nuffield experience allows scholars to consider a wide range of issues relevant to NZ agriculture. The state of our competitors, the potential for product substitutes, the attitude of the urban public to agriculture and environmental issues were all additional subjects of interest. A series of farming magazine articles written during the course of my studies are appended to this report.

2 Acknowledgments

Any list of acknowledgments for this report should be extensive but in the interests of brevity, I would particularly like to acknowledge:

- ⇒ the New Zealand Nuffield Farming Scholarships Association and the main sponsors, Dairy InSight and Meat NZ for their personal and monetary support
- ⇒ the Australian Nuffield Scholars association for organising the pre-tour briefing and group tour
- ⇒ Fonterra staff for their help in framing my topic, in executing some key in-market interviews and for their friendship
- ⇒ the UK Nuffield Scholars, particularly Mr John Stone and 'the class of 2004'
- ⇒ NZ embassy staff for assisting with visits
- ⇒ the many friends that I have made around the world

Above all I need to thank my wife Alison and daughters Bridget and Jaime-May. Running two farms, a full time job and a family qualifies Alison as a hero; for being so good in the absence of their Dad makes for two very good girls. Thank you.

3 Aims\Objectives\Study Goals

Goods and services seem to commoditise at an increasing pace; in late August 2004 I found a DVD player for sale at $30 – I can remember similar items for sale for prices in excess of $500. And we well know that given freer world market conditions, it is a race for the bottom in the price for all agricultural commodity goods.

Supposedly eminent economists attack the agricultural sector for our lack of added value. But what do they mean, and what do we do about it?

The sole aim for this study has been to better understand how companies innovate, and how NZ companies can innovate better. As a farmer, my interests are targeted to the food sector, but the learnings are of wider use.

So my research wasn't to find new ideas or product concepts, but to understand the concept of "Managing Innovation". That is can we increase the proportion of sales from profitable products released in the last three years? And can we increase organic business growth as a result of innovation?

This report is about combing the concepts of innovation (creativity, change, speed) with the concepts of management (planning, organising, monitoring and control) to better understand how senior management and boards can lead successful value added organisations.

4 Introduction - to innovate or stagnate?

There is no doubt that a significant revitalisation of New Zealand agriculture occurred during the 1990's. The size of this revival, from 12% of GDP to 17% of GDP[2] and how it was achieved, is probably unique within growing western economies.

Yet what is our vision toward 2010 or even 2020? Is our agriculture industry mature with only incremental performance improvements possible? Will tourism replace farming as New Zealand's major industry? The question is do we, New Zealand farmers and society, have the courage to adopt a strategy for continued growth?

As stated in the title of this report – 'to innovate is difficult, but without innovation, companies die'. The innovation that occurred in the 1990's had its roots in tough and changing times. Subsidy removal; commodity price fluctuations reflecting an obscene European Union agriculture policy; the reduction in sheep numbers and flow through effect on the meat processing industry, and; the rapid consolidation of dairy co-operatives were all factors for change.

In response, innovation and change embraced all segments of the industry; farmers increased scale and improved lambing percentages, per cow milk production and crop yields. The dairy industry achieved a step change in processing technology through the construction of innovative and large-scale plant. Meat companies innovated work practices and technology, and started the shift from exporting frozen carcasses to supplying chilled products. Market innovation came from better targeting quota markets, the smarter utilization of by-products (whey, offal) and product development (Anlene).

The question to be asked now, what are the drivers for further innovation, and where will that innovation come from?

For with globalization commercial products and services are quick to commoditise. Companies are left with the unrelenting pressure to come up with the next wave of innovation. Failure to innovate equals failure to differentiate equals failure to garner the profits and revenues needed to attract capital investment. It would pay us to get out in front of this Darwinian process.

Yet in the past few years the drivers for innovation seem less obvious. We are now farming successfully without subsidies and have a cost structure which today means we can manage typical commodity price and currency value fluctuations. We look to the future with some hope that even modest world trade reform will improve market conditions. We have completed the rationalization of dairy co-ops and we now have a better balance between supply and process capacity in the meat sector. Even the threat of a new multinational competitor affecting our processing co-ops seems increasingly unlikely as they step away from raw material processing to concentrate on value added products and brands. Is life becoming comfortable?

[2] See MAF; Contribution of the Land-based Primary Industries to New Zealand's Economic Growth

The answer from any farmer battling with a cold wet spring, or from a sharemilker trying to get enough money together to buy a farm, is of course not. But from an industry perspective? Perhaps.

And is innovation and change in itself good? From a Canadian dairy farmers perspective (the recipient of magnificent market-funded subsidies), not at all. But where we rely on earning our income on world markets, we must innovate or stagnate.

It can be argued that there are significant threats to NZ agriculture, but because they are external, they could 'creep up on us', unnoticed. And when we do notice because at the bottom of a future commodity price cycle more of us are hurting; perhaps the past responses of manufacturing consolidation and cost reduction won't be relevant. Are we at a stage where we require investments in things other than stainless steel – perhaps new products, intellectual property and brands?

But firstly, what are those threats?

One is the downward pressure on all food products due to the increasing power of supermarkets and multinational buyers. Their purchasing power (see the case study "Tesco", page 21) will ensure that the historical downward trend in commodity prices will continue. In the next 20 years this trend is likely to continue as retailing consolidates around the world. For example, currently large-scale supermarkets have huge market share in western countries, yet only influence 20% of the world's retailing. Clearly there is room for more consolidation amongst relatively few players with continuing downward price pressure on producers.

Another is the real risk that we won't retain our position as the world's low cost producer. The USA has some farm systems that rival our costs of production – we can certainly never compete with the scale achieved with west-coast feedlot farming. South America has untapped potential that will, in the end, undermine our ability to profit from commodity products – at least for beef and dairy.

We have always been able to ride out past commodity price cycles because whilst we were struggling, most others were 'struggling worse'. If we are not in the lowest cost position, we run the risk of being squeezed up and out like a pip between thumb and forefinger.

Finally, there is a threat from outside our own sectors - the Soya industry. In New Zealand Soya is considered a second-class product. But if it is produced cheaply enough, and biotech is helping that happen, there will be a 'sinking lid' on the price food manufacturers are prepared to pay before switching from animal to Soya protein. The Soya industry is vast compared to the New Zealand economy, and is also investing heavily into R&D that improves the taste and mouth feel of Soya, and into discovering and utilizing the functional benefits of Soya protein constituents.

The thesis presented here then is that if we rest on our haunches, we will find the world a very difficult place to sell commodity products in 10 to 15 years time. The pattern for our own potential decline is well established in every other Western society – with agricultural sectors that don't matter to the success of their country's economy and are continuing to fade.

So what do we need to do?

The first answer is to be urgent in achieving further efficiency gains. In 10 years time, our real costs of production need to be lower than today. The target set by McKinsey and others of 4% p.a. efficiency gains needs to be achieved. And this is despite being part of what will hopefully be a successful economy, with higher wage and perhaps infrastructure costs.

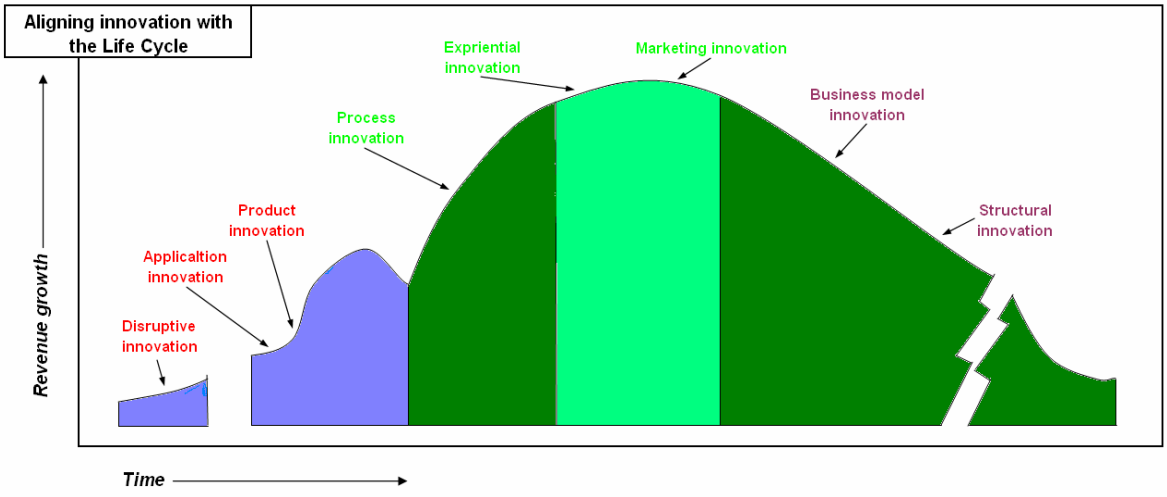
As farmers we have the tools to deliver part of the answer ourselves through more targeted and insightful spending of our commodity levy investments in R&D and extension. We also operate in an environment where the best farmers will grow and expand, perhaps at the expense of our traditional family farm structure.

But where the motivation for this report is focused, is the need for innovation in our processing and servicing sectors. Where is this likely to occur?

This report is not about identifying innovative ideas – farmers are not engineers, automation experts or logistics gurus – at least this one isn't. But in attempting to learn about the innovation process, some contextual theory helps.

The following, lifted straight from the Harvard Business Review, implies that different forms of innovation are relevant to the relative maturity of a market. This author would submit that, taken as a sector, New Zealand agriculture is mature – with few opportunities for rapid revenue growth.

To take a dairy industry example, the milk powder market in the 1970's was probably relatively immature, but process innovation resulted in the technology for large and sophisticated milk powder driers now installed throughout NZ. Product innovation has also occurred in the early 1990's with the introduction of the flagship Anlene brand featuring elevated calcium levels.



Yet on the face of things, there is a ripe environment for product innovation. For example, looking at the products we produce, our milk and meat are a ready source for peptide and amino acid fractions, mineral components and the other building blocks of food.

And as the human genome continues to be unpicked, it is possible that we will see a change from the mass-marketing strategies adopted by retailers throughout the later half of the 20th century, to providing food that both tastes good and suits our personal health needs.

Even without this clinical approach to our bodies and diets, there are huge demographic and socio-economic changes taking place that provide opportunities for the visionary food business. To take the bulge of elderly expected over the next twenty to thirty years, products that provide nutrition and help with bone health, the immune system, the digestive system, muscle mass, pain, brain activity and sleep will find a growing and lucrative market.

So perhaps whilst our traditional process innovation will still serve us well, we need to expand and multiply the Anlene type products we manufacture and market. And the step change we achieved in moving from frozen to chilled lamb – what is the next step?

It is this scholar's contention that innovation starts with a vision – in this case we need a vision for 'NZ Agriculture Inc'.

A vision for New Zealand agriculture shouldn't be for survival, or even to retain our existing important place within the NZ economy. It must be to be the best in the world for our respective sectors.

This author can't personally think of a better vision than the Fonterra one; 'To lead in dairy'. It reflects the needs of the co-op members and is sufficiently focused as to be attainable. A similar vision, if it doesn't already exist, must be; 'To lead in lamb'. Whether or not we can lead in any way in the beef sector is debatable.

As a passionate and reasonably young farmer, it is in my interest to support a growth strategy based on innovation. There are roadblocks to this approach – for example older fellow farmers might understandably plump for a business as usual approach rather than investing more heavily in R&D that may be slow to generate cash. But there is a saying – a business (insert industry) has only two options, to grow or stagnate? Which option will we choose? This writer is personally optimistic. New Zealanders are rarely comfortable standing still and we have a tradition of leaving our industries in better shape than we left them.

So then, we need to understand the category and the product trends, to consider our comparative advantages that we need to defend, and the competitive advantages we can seek to exploit. We probably need to focus on 'being the best' in a limited range of things to ensure that we can continue to lead in agriculture.

I hope I haven't turned many readers off (this is hardly a best selling novel anyway). But in a rather long-winded answer to "why study innovation management", innovation is undoubtedly an important ingredient to the NZ Ag sector's success.

5 Innovation theory – large companies

Managing innovation within a large company environment is about trying to achieve the creativity so common within small entrepreneurial companies, yet harnessing that innovation for the benefit of company strategy. It is also about creating new products to drive sales tomorrow whilst also creating opportunities for disruptive change for the future. From a large company's view point, successful innovation management helps improve the odds of creating profitable new products, services and ultimately, businesses[3].

But from the case studies, it is apparent that no one combination of management approaches is the answer to success. The successful ingredients vary according to industry characteristics, market conditions, the competencies the company is exploiting and the business strategy being adopted.

In a following section, five large food companies and a large (food) retailer have been chosen to illustrate how innovation theory works in practice.

1. Danone; No. 1 in fresh dairy products and likely to stay that way.
2. Nestlé; the world's largest food & beverage company with a science-based focus to innovation.
3. Kraft; second only to Nestlé but with a focus on product development.
4. Kerry Group; a diversified foods and ingredients business.
5. Bernard Matthews; a leading supplier of consumer meats.
6. Tesco; the United Kingdom's leading retailer.

From a mixture of reading and a reflection on case study work, it seems that innovation management relies on;

⇒ The company's *vision and business strategy.* The company vision must be aspirational; the strategy should reflect both market requirements and a company's core competencies. Tesco and Nestlé demonstrate vision and strategy that demands the creation of new ideas, products and processes.

⇒ A supporting *innovation culture*, such as that displayed within Kerry's strategic business units, that allow all company staff to innovate, rewards success but understands failure, and fosters internal and external networks.

⇒ An *innovation strategy and business structure* that allows innovation to be expressed. Nestlé has a highly developed R&D strategy that supports the business strategy of targeting number one or two position in the market and uses a mix of a superb central research facility, devolved technology development centres and investments in venture capital funding.

⇒ *Intelligence* – including the orderly gathering, processing and use of information. Bernard Matthews uses store sales and market research to drive product development.

⇒ *Innovation tools* that results in a superior conversion of R&D spend into profitable process improvements, products or services. The tools discussed here are the innovation pipeline, product lifecycle analysis and portfolio analysis. Danone displays excellence in employing these tools.

[3] US data suggests that between 85% of new business ventures fail, the OECD reports that 80% of R&D spend isn't commercialised successfully

⇒ *Managing the skill base* – addressing issues such as the recruitment and retention of people with the needed conceptual and scientific or technical skills, or of accessing those skills externally. Most of the companies studied, as leaders in their field, had strong resource recruitment and retention capabilities.

A range of books have been referenced with extensive theory on innovation management. But case studies are much more interesting!

6 Innovation lessons in a large company environment

6.1 A benchmark company – Danone

Anyone studying innovation management in the food sector would do well to visit Danone early in their trip. The focus and level of effort that this company brings to the fresh dairy[4] category is nothing but impressive. They aim for their products to be No. 1 in their relevant domestic market – and claim that they achieve this with 70% of their products. As a company Danone is a significant business with US$13 billion in sales.

The Danone vision is; "Through (a) pioneering spirit (we) will create and secure future access to products that consumers choose for their health and nutrition and prefer for their taste".

The R&D team's stated role is to ensure quality of products, especially at launch, to provide legitimacy to scientific claims, to explore and develop new product opportunities, to be a catalyst for change and to be a guardian of Danone's scientific know-how.

The innovation strategy aims to deliver on the following four themes:
1. Active health; reinforce the Danone image of products with a health benefit
2. Nutrition; to follow good nutritional health practices
3. Preference; measured as superior to competitors for customer choice
4. Technology; harmonise processes around world (SAP), improve time to market and world-wide roll out and, improve cost effectiveness.

"For Danone, R&D, particularly in the health and nutrition area, is becoming a larger part of the company's growth strategy…."

A tour of the Danone Vitapole R&D unit gives the impression that the level of investment and singularity of focus provides competitors in fresh dairy with a high hurdle.

Danone follows an innovation pipeline process similar to that described in section 9.1 of this report. In early 2004 they had approximately 70 fresh dairy projects, with a mix of timelines for delivery. There are usually only two to three long-term nutritional projects running at any one time.

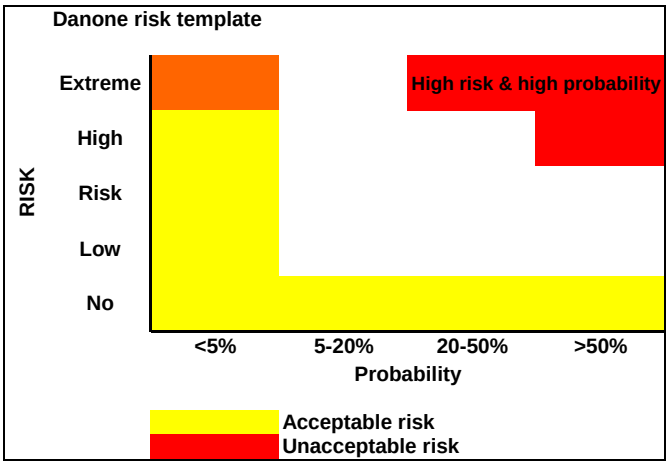
In terms of the people involved, each project has a client (the target customer and leader), a project leader (scientist), coach (specialist project manager), and a project team staffed with the relevant staff from across divisions. Resources / priorities and stop / go decisions are made by a steering committee that oversees the whole process.

Each project has an objective (and context), deliverables, allocates responsibilities, allocated FTE staff resources, a budget for external contractors, and an overall budget.

[4] Yoghurt, fromage fres cultured foods, fermented drinks

Actions are planned for the timeline of the project, including the inter-relationships with other relevant or dependent projects.

A feature of the Danone steering committee is that it takes a very active role in risk assessment – "and won't hesitate to stop projects". A formal risk management matrix is assessed for every project-identified risk. At each decision point the steering team asks the questions, "what is the risk", "what can we do", "who will do it", "by when". The attached risk template is completed for each item; financial, technical and market. Unless a high risk / high probability issue can be addressed, the project will be cancelled.



More detail on Danone's innovation strategy and use of internal versus external resources is included as attachment x. Whilst this company almost certainly has limitations or weaknesses, they are not obviously apparent.

6.2 Nestlé versus Kraft

Nestlé and Kraft are the world's number 1 and 2 in the FMCG food and beverage category respectively – this alone makes their innovation management processes worth studying. And yet despite both having a focus on FMCG, they approach their innovation strategy very differently.

6.2.1 Nestlé - a science-based innovation company

The Nestlé vision is "to lead in food, nutrition, health and wellness". Their theme is "Food for growth, food for energy, food for life". Perhaps in typical Swiss fashion, their strategy and supporting research efforts are targeted and deliberate.

Innovation is relevant to three of the four pillars of the Nestlé strategy (the remaining addresses manufacturing costs);

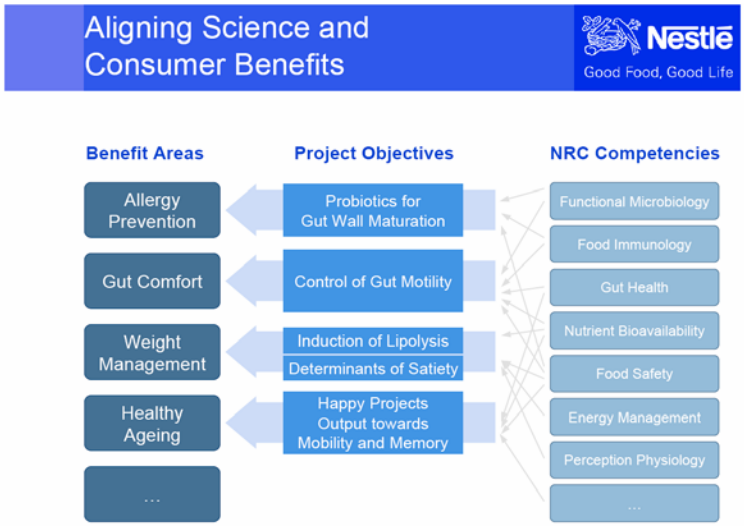
⇒ Innovation & renovation; to drive organic growth.

⇒ Consumer communication (branding, marketing, advertising); ensuring that consumers are aware of the innovative products available.

⇒ Whenever, wherever, however. Using innovation (and acquisitions) to ensure products are available to everyone all of the time.

Nestlé appears to have a balanced innovation strategy focusing on incremental improvements (product renovation) whilst also looking for break-through or disruptive change. At the basis of their strategy is their aim to develop "branded active ingredients" that can be applied to develop new functional products. Through the use of product claims and patents they aim to develop products that will be sustainable as No. 1 or No. 2 in the market.

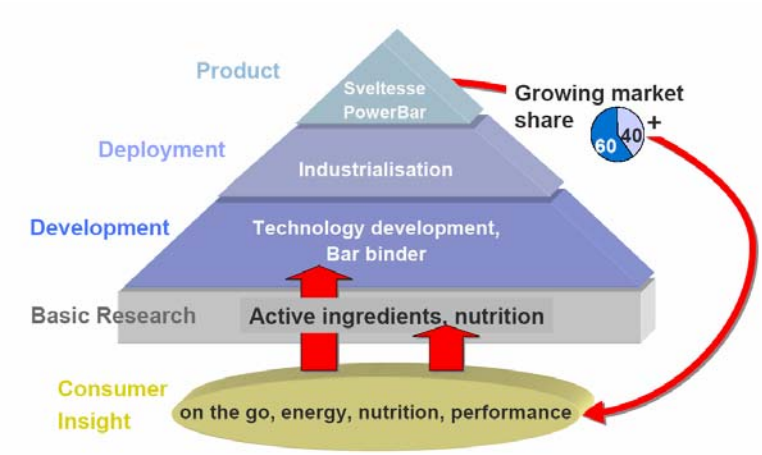
This science-based strategy draws on industry mega-trends; convenience, an aging population, a more affluent and discerning middle class and the growing group of customers relating food and health (particularly). Products are being renovated (reducing calories, sugars, fats and salts; smaller portions; fortification; addition of fruits) as well as being 'invented' (solutions for obesity; providing balanced nutrition; easy digestion; resistance to disease; strong bones; lower cholesterol; clear skin; no allergies; less colic). A summary of the Nestlé 'nutrition and wellness' approach is shown in the following figure.



The Nestlé innovation culture appears to be one of industry, rigour and pride. Staff are proud of their science, the Company prominently displays innovation / product development displays at head office, and their in-house restaurant meals are labelled with calorific and glycemic[5] index information.

In terms of structure, the Nestlé Research Centre (NRC) employs 600 scientists focused on strategic / basic research. It is the 'think tank' for new ideas and plays a central role in generating scientific knowledge in active ingredients, food science and nutrition. Its primary role is to feed the Science and Technology pipeline (what might be called 'pipe-line stuffing') before passing projects to the development centres (there are 18 Product Technology Centres under common management). The following figure shows graphically how the Sveltesse power bar was produced using this successive discovery, development, deployment strategy. Note the 60% test adopted by Nestlé; 60% of consumers must prefer Nestlé products at a blind test.

[5] A measures of the speed at which a food's releases sugars into the blood stream – a factor in managing diabetes.



Finally, Nestlé has a subsidiary, Life Ventures; who operate a venture capital focused on acquiring new science and technology relating to food & nutrition. During 2003, Life Ventures assessed 500 opportunities and made eight purchases. The purchase process is described in the following schematic.

6.2.2 Kraft – A fast moving consumer goods culture personified

Kraft produces snacks, beverages, dairy (cheese and fat spreads), grocery, and convenience items – they are an iconic American company with two thirds of their US$31 billion of sales derived in their home market. This 'American-ness', with the pressure to produce good quarterly profits and earnings guidance; results in product development / line extension form of innovation in order to support short term growth imperatives.

The company's growth performance has recently been subject to market scrutiny. In response to this pressure, Kraft leadership recently announced four strategic themes; a focus on brand values (increased spending on advertising and promotion); a shift of their portfolio towards health, wellness and convenience; to expand global scale, and; to reduce their costs and asset base.

The Kraft R&D strategy still appears to emphasise the importance of fulfilling customer needs and the need to keep a full pipeline of new products and ideas for release in 12 – 24 months. Approximately 80% of R&D projects focus on short term product development and line extension, often utilising or combining ideas from other categories. This might include combining foods, providing new packaging, or using new presentation formats. Innovation in this context can be problem oriented or may focus on growing a category (e.g. low carbohydrate products).

In contrast to Nestlé, the Kraft perception of designing products for health and wellness, with the exception of the obesity issue, appears to be limited. In terms of responding to aging trends, the response was "what product should we release next year because there will be a boom in the over 60's by 2020?" An interesting view was "Americans prefer to keep their food and medicine separate – that food delivery of 'medicine' was too complex for most people" (almost an attitude of 'I'll eat what I want to eat and fix the imbalances with a pill – perhaps part of a cultural obesity problem?').

R&D at Kraft is focused on new products that will achieve incremental growth – i.e. a greater share of the stomach.

In terms of process, Kraft is developing a new I2M (Idea to Market) system to support their concept of 'Fast and Best to Market. The analogy was; "kids are most innovative at kindergarten, they lose an element of that when we give them the structure of going to school. But have you ever seen a kindergarten kid achieve anything other than anarchy?" Without being specific, the Kraft innovation process is applied more rigorously as risk increases (technical, market, financial).

Kraft's innovation structure is based around an R&D head office in Chicago, supported by four divisional R&D centres in the US, one in Germany and one in the UK. In addition Kraft has a range of global centres of excellence with focus on troubleshooting and meeting local customer needs.

6.2.3 A comparison of Nestlé and Kraft

So whilst the world market for food is many trillions of dollars, and collectively Nestlé and Kraft are only a small percentage of this (>US$100 billion), they do compete for market share in most categories, and they certainly compete for share of stomach for FMCG in rich western countries. The focus of their innovation efforts are compared and contrasted in the following figure.

Nestlé	Kraft
R&D spend US$970 million and 1.4% of sales	R&D spend US$380 million and 1.2% of sales
R&D strategy focused on IP development and underpinning products with health and wellness claims.	R&D strategy focused on being "fast and best" to market. IP development is focused on "the right to make and sell a product, rather than on making product claims
See functional foods (products with a health benefit) as a real opportunity for the future	Food is food – it needs to fulfil customer needs in terms of taste, cost, convenience etc – whilst, where possible, being formulated to be healthy
Innovation pipeline has a mix of basic R&D and product development	Innovation pipeline largely focused on product development with 18 month time to market
Neither company considers licensing IP to third parties as a core strategy. Both consider any player in the food industry as ultimately competing for 'share of shelf-space', 'share of stomach'.	
Both follow standard innovation pipeline processes, but decision criteria in terms of strategic fit and financial returns, at least in terms of timeline, vary markedly	

6.3 Kerry Group

The Kerry story is four fold; a company with an interest in a large array of food products and ingredients; a decentralised organisational structure that leaves innovation efforts to separate business units, and; an acquisition strategy that is focused on building IP.

Kerry, initially an Irish dairy co-operative, has evolved and grown into an aggressive foods and ingredients business with turnover of about US$2.3 billion. Key businesses include lifestyle and nutritional products (cheese snacks, processed meats, pre-packed sandwiches) ingredients (emulsifiers, proteins, Soya) and flavours and coatings.

Kerry owns and operates 130 manufacturing facilities and provides 10,000 food and ingredient products – an astonishing array of products given their relatively small size. Their mission displays this complexity;

> "Kerry Group will be a major international specialist food ingredients corporation, a leading international flavour technology company and a leading supplier of added-value brands and customer branded foods to the Irish and UK markets…."

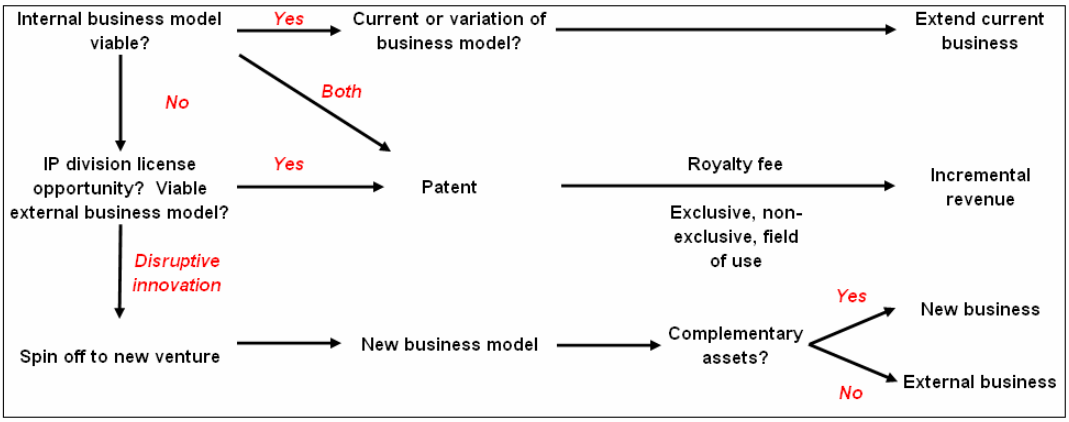
Kerry's organisational structure is via independent Strategic Business Units (SBU's), each with their own general management, production, sales, marketing and R&D team. These business units are expected to achieve growth of 15% (double size every five years) and achieve earnings of 15% EBITDA. How this growth is achieved is left to the SBU management team; the corporate expectation is that 25% of growth will come from organic growth, 75% through acquisitions.

Kerry delivers innovation through a network of 25 technical centres (approximately 450 R&D personnel). Development staff operate from their specific business units, supplemented by corporate support teams. The majority of Kerry's 300-plus scientists work in product development on customer-specific projects on a proprietary basis. Trained chefs, sensory experts, analytical scientists, and other specialists providing in-depth research into raw materials and processes all help support these development scientists. An example of such an innovation approach, the development of the adult cheese snacking category, is included as an attachment.

From an innovation management perspective, one would expect such a decentralised structure to result in inefficiencies – project funding may not be optimised for the whole business, there may be replication of efforts (and higher overheads) and a loss of 'idea-flow' in the business. Kerry counters this through the application of a very rigorous innovation pipeline (the Kerry model for this pipeline was used as the template for the attachment x), ensuring each project gets the same level of scrutiny, irrespective of the business unit involved. And whilst some replication and loss of idea flow may be negative factors, this is presumably at least partially overcome by a business dynamism achieved through the operational control and accountability with the SBU management team.

Kerry's acquisitions are now focused on the purchase of Intellectual Property. They employ a number of experts in new ventures and long-term new technology development to ensure that acquisitions add real value for the company. A recent example is the purchase of Quest Food Ingredients, a company heavily invested in fundamental science / food nutrition based innovation - and into pharma-foods prospectively.

The final point is an interesting schematic that helps make decisions about the application of IP. Figure x is a combination of the decision making process used by Kerry to decide on the use of a new concept and that discussed by x. Concepts that fit the existing business strategy and business model are utilised to extend the current business; but good ideas can still be utilised through licensing or through fostering start-ups alongside or outside the company.



6.4 Bernard Matthews

Bernard Matthews has made a business in the difficult branded lamb product market in the UK and Europe – they process 6% of lamb in New Zealand and control 13% of the NZ-sourced UK lamb market – with all of their products sold within the retail and food service categories.

Their case study is important because it shows how lamb, a product important to the NZ economy, can be transformed through innovation from a commodity to a value-added product. Whilst the basic product, lamb, is undifferentiated there are a range of strategies that can be adopted to make the product more convenient and improve its perceived value and quality.

By way of background, NZ lamb ranks well in the UK, chilled NZ lamb ranks in the top four of 23 main meat product lines. The product is stated to provide an excellent consumer offer in terms of cost and quality[6], and is well supported by the industry and company structure back in NZ. However, at the same time the industry faces threats; the control of brands by super markets, the control of further processing by third party suppliers who may utilise NZ lamb to subsidise their own operations, and the belated push from UK farming organisations to "buy local".

A visual assessment was that whilst NZ lamb is promoted well generically, supermarket-branded NZ lamb appeared to be poorly presented (both packaging and the cut of meat). There appeared to be little if any category or product development.

Because Bernard Matthews operates in the branded end of the market they are well placed to drive innovation for the category. Their product offering to consumers includes product guarantees (tenderness, availability, portion size, flavour and price/value), that sourcing is from a free range environment and a range of product packaging and presentation formats to suit consumer requirements.

From a customer perspective (e.g. Tesco's, who has granted the company 'ownership' of the frozen lamb category), Bernard Matthews offers rolling innovation in product development (e.g. alternative shoulder cuts), product format (cooked meat in a bag), and packaging (new branded bag presentation.

[6] Information sourced from GIRA strategic multi-client research program, "Meat differentiation – opportunity or distraction", September 2002.

Key to Bernard Matthews' success is their;

- ⇒ focus on understanding the lamb business (from a sourcing, processing, and packaging perspective) better than anyone else
- ⇒ vision to offer a branded consumer product
- ⇒ ability to invest in innovation and marketing
- ⇒ market intelligence. They purchase Taylor Nelson consumer data and spend a lot of time and effort on gap analysis and possible product development.

Based on data they can make marketing decisions in partnership with their supermarket partners, but can also review product offerings, consumer habits and packaging options.

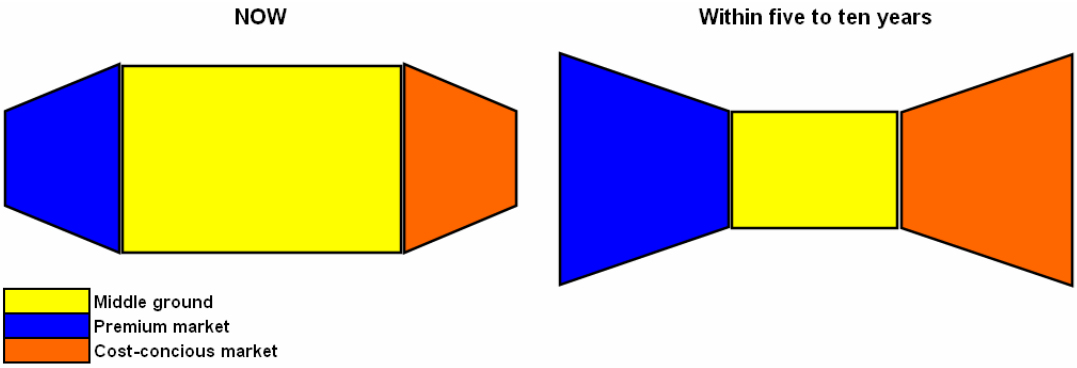
6.5 Tesco

Tesco's have been included in this case study because they are an extra-ordinarily successful business (27% share of the UK supermarket business and profits of US$2.7 billion) and, because whilst they have a view on innovation, their business culture sometimes gets in the way.

The Tesco VISION (capital letters because it is a dominant vision) is to operate what their staff refer to the virtuous circle – "**BETTER** (increase quality), **CHEAPER** (reduce cost), and **SIMPLER** (increase speed)".

The Tesco strategy tries to support a 'broad church of customers' incorporating six segments; price sensitive (everyday low prices), traditional, main stream, convenience, healthy, and finer-food. They have demographics and personalities for each of these segments.

Their view is that, as shown in the following figure, if they want to be the dominant supermarket in future, they need to provide a service to all customer groups. Their view is that the market is starting to split away from the middle ground, with both premium and cost conscious customers becoming dominant.



Tesco's is an innovative company in achieving its goals. Two examples demonstrate; the approach to change product displays and the rejuvenation of a new potato product. As a company they have significantly higher foot traffic per square metre of floor space than competitors; they therefore need to focus on the efficient use of shelf space and an efficient shelf replenishment process. Recently new produce fixtures were

changed in the fresh fruit and vegetables category to achieve a 25% increase in volume – including shelf ready units, by avoiding decanting, and by being clever with the range of products presented (timing, accessibility and launch products at competitive prices).

The second example shows how, with a strategic focus they were able to innovate the fresh Jersey potato product line (see attachment).

But whilst Tesco has demonstrated innovation, they struggle with establishing an innovation culture. Recently they set up an innovation team to create ideas and instigate solutions. In a three stage process the team from various parts of the grocery section attended two workshops to focus on innovation skills and a task oriented look at data and information. They then spent four weeks away, in which time they defined a vision; "passionately living the world of food", learnt about successful innovation cultures and built an innovation tool kit for the company.

However, despite words and investment, focus on costs and speed cut across the process. It has not been until senior management have bought into innovation some two years later that some progress is being made. In the apt words of a staff member "Tesco was a meat and two veggies company and couldn't transform itself overnight to sushi without consistent and focused support from senior management". Senior management have now given overt support to innovation through an open plan and 'break-out' office redesign and the roll out of a general innovation course covering ideation, innovation concepts and innovation tools. Only time will tell whether or not they can break out from their traditional focus on process and supply chain innovation.

7 Managing innovation in a small company

The small and medium enterprise (SME) sector is an important contributor to economic activity in NZ; it is also an important source of innovation. OECD data shows that SMEs provide approximately 45% of all major innovations[7].

From an SME perspective, innovation helps a small company compete and grow beyond traditional service or product commodities. But the management of small companies are typically too busy with everyday demands to spare much time or money to invest in a new idea or new ways of doing things. Innovation often requires a significant capital investment relative to the total assets of the company, will often require the deployment of new skills (e.g. technical, financial, human resources, marketing) and the implementation of a large project may even risk the future viability of the firm.

The following table, lists the key limitations to innovation likely to be faced by SMEs versus large companies. The two case studies, in this case non-agricultural firms, clearly illustrate the SME limitations to innovation – but at the same time they are a form of organisational structure that posses a lot of the dynamism and strength of focus necessary for major innovation to occur.

SMEs	**Large companies**
Inability to access capital for large, capital intensive innovations	Corporate bureaucracy and slowness
No reputational clout for filtering of ideas	Lack of motivation and purpose
Inability to scan for technical opportunities and market acceptance	Unwilling to cannibalise existing product lines
Any gestation period places pressure on cashflows	Internal communication often poor
No existing distribution system or customer base	Constraints created by quarterly profit expectations
Government programs suit strong and stable businesses with the resources to develop a project business plan and provide matching finance	Inability to recognise and chase disruptive innovation.

7.1 PSA Composites

PSA Composites is a Canadian plastics R&D company that specialises in steel-like processing of plastic materials in a solid state. Through a process of pulling composites through a dye (rather than pushing) the company fortuitously discovered that the polar mismatch of the plastic constituents created through this process had produced a material that had structural strength and flexibility whilst also having half the density of traditional wood-substitute products. A start-up venture formed out of PSA is now building its first factory on the promise of a contract with a major US home hardware retailer to provide decking, exterior cladding and fencing material. The concept is supported by compositional patents in all major markets.

[7] E. M. A. Maine, (2000). Innovation and adoption of new materials. PhD Thesis.

Today the story is an exciting one, the inventor has a 42% share of a new venture and is in the process of seeking patents for a range of other related and exciting products that will create revenues from a range of potential sources (buy-outs, licensing or from more company spin-outs).

However, it took 15 years of frustration and delay to get there, and Government innovation programs weren't particularly helpful resulting in the loss of the technology and production from the country.

Initial R&D and product development was slow. The first commercial product, plastic drum sticks, proved to be unsuccessful. The business had to be funded from consulting income at some cost to the standard of living enjoyed by the principal. When the oriented polymer product was discovered, a period of testing ensued to confirm the product's qualities; the company started the patenting process and looked for avenues to market. This was a difficult process - large firms tended to be focused on their own competing technology, and there was no formal or useful help available about how to consider the best channels to market. Where there was interest, the company wanted to see scaled up production to test the manufacturing process and to determine the associated cost structure. Funding for this was difficult, the firm was still too small to attract venture capital and the angel finance market is still weak after the "dot com" led stock market crash and reported poor treatment at the hands of VC firms.

In the end the principal inventor teamed up with a small group of investors that were active in the new materials industry – contributing $4 million to build their first facility next to a key outlet of the hardware retailer (with whom they had a memorandum of understanding). The inventor lost control at this first round of financing and the first (and additional) facilities are to be built in the USA, not Canada.

SME lessons learnt	**Problems in encouraging innovation**
From idea to a commercial outcome can take a long time – time which many SMEs cannot afford.	Helping SMEs determine 'proof of concept' isn't often enough. The more challenging question is the path to commercialisation
Despite an attractive idea, most large firms or venture capitalists want to see the product or process operating at some scale so they can satisfy technical and process feasibility questions	Usually commercial scale-up is left to the private sector. Yet if an economy has a) poorly developed Angel or VC industries or b) communication channels between these sectors and SMEs are poor, then good ideas and new businesses will be lost to oversees markets where there is a more successful commercialisation industry
Angel finance is one of the few ways to bridge the gap between a start-up and a business that will attract VC or large firm interest	Has much thought been given to developing this sector and ensuring that they have strong industry representation?
By protecting the range of inventions through patents, this small company will ensure it reaps at least some of the benefits from their invention.	In industries that feature more fundamental innovation, speed to market is unlikely to be a form of IP protection; patents become a more important part of the process.

As a footnote to this story, the principal was a gentleman in his mid-seventies unlikely to benefit financially from his endeavours. But the achievement of going from idea to concept to early-stage financial success was a huge fillip for the man.

7.2 DC Inc

DC Inc[8] is a small enterprise based in the South-west of England dealing in computer software, hardware, networks and general IT services for their region. Over time they have found that the business has changed from selling computer hardware and software to providing IT services. Whilst these core products provide a revenue steam, they will never lift the company beyond the mediocre. To really grow requires 'a big idea'. The following is one idea of two discussed.

For DC Inc one big idea is to consider computing as a utility rather than a product. Rather than a customer purchasing and maintaining their own software and network, the 'big idea' is to offer and maintain all programs centrally, via a high-speed broadband connection. To a user the PC would appear to operate as normal, but would actually be sourcing programs located remotely. The user benefits include always up-to-date software, fewer outages, bugs resolved quickly (24x7 service), systems maintained and backed up, reduced costs. From DC Inc's view point the customers become 'sticky', providing a regular revenue stream.

A number of problems exist with the idea itself. Firstly it is technology driven rather than market led – it is not fully market tested. Also, customers are becoming fully dependent on the service provider for their (critical) computer services. For example, will the technology provide the required consistency; will broadband faults impact on performance; will the service provider still be in business in three years time?

To get some competitive advantage, DC Inc needs to be on the 'front of the curve' with utilising new technology – this means that the technology is usually more expensive and less reliable. DC Inc is dependent on many parties to achieve the required technology and communication solutions

DC Inc suffers the normal SME problem with funding. Despite some commercial and impressive support (Cisco systems, Hewlett Packard), the project is beyond DC Inc's ability to fund. They need support to develop the idea, to undertake some development and testing, then to implement.

And whilst the owners have the capability to professionally manage the project (consulting background), they don't have the ability to continue current operations and manage such a major innovation project.

One interesting challenge that is typical for a new product or service; how to price it? Often at this stage of the project, the costs are unknown, so a 'costs plus a margin' model isn't applicable. A competitive pricing model isn't yet applicable. Finally, the value of the service to customers hasn't yet been assessed so a value pricing model isn't appropriate.

[8] A fictional name but a real company based in Southern England

Again, although not a food industry company, the DC Inc case study shows that start-up companies formed around a big idea can suffer from a range of technological, marketing, funding and growth issues.

7.3 A management process for an innovation project

The following figure summarises the steps that a SME (or any company) needs to follow and 'tick off' to ensure that they have a good chance of success. This checklist has been adapted from the list utilised by the Small Business Service (Dept. Trade & Industry, UK) to assess the suitability of projects being presented for joint funding.

Whilst this list serves a function in ensuring that only projects that have been properly assessed are progressed, in itself it is problematic. Firstly, few SME management teams are resourced or capable to complete all the required work.

(1) The Project Plan

Ideal scenario: The project is clearly defined with milestones and review points.

(2) The Market

Ideal scenario: The market has been thoroughly researched and is accessible.

(3) Risk

Ideal scenario: The risks and rewards have been carefully assessed and the business is comfortable with the levels of risk.

(4) Human Resources

Ideal scenario: The human resources are in place and their skills are adequate and appropriate for the project.

(5) Financial Resources

Ideal scenario: The business is financially sound and will be able to complete the project and its subsequent commercialisation without undue adverse impact on current income streams.

(6) Project Management

Ideal scenario: There is a credible project plan in place, which includes appropriate allowance for the complexity of the project.

(7) Strategic Fit

Ideal scenario: The project is a good fit with the business strategy & the business is clear how it will maximise its benefit from the project.

(8) Competitive Position

Ideal scenario: Business and project are in a well understood and protected segment of market, able to withstand competitors' response.

(9) Environmental and Social Impact

Ideal scenario: The project will have a positive impact on the environment and socially.

8 'Venture-land'

8.1 The general concept

'Venture-land' is an endearing title from a very nice and successful Venture Capitalist from Boston, Massachusetts.

Venture land originated in the United States after the WW II. Returned service men were graduating from university, full of good ideas, but into an environment of low employment and poor access to credit. The first venture capital funds started up as $50,000 investments by banks and life insurance companies, but soon spawned into the many hundreds of venture capital businesses that are a now a feature of the USA investment landscape.

The basic structure of a Venture Capital (VC) fund is that the VC company invites offers to subscribe to an investment fund targeting a sector or sectors that are consistent with the firm's expertise.

The investment fund will be for a specific amount (say US$200 million) and period (say 10 years) and will target new start-ups or young companies with an attractive technology, product concept or business model. As companies for investment are confirmed, the VC company will call for draw-down on the funds committed to it until the fund has reached its investment limit.

The actual investments are usually majority or complete buy-out stakes in what in the USA are called Participating Preferred Shares – they rank ahead of common shares (which may be held by the start-ups management team) on the eventual sale or liquidation of the company.

On the wind-up of a successful fund, the investor will receive their money back, plus (in some cases) the value of a per annum coupon rate. The profits above this are split between the VC company and the investors in an agreed ratio (perhaps 20%:80%).

A rule of thumb is that for 10 investments, if there is one good success, two moderate successes and seven failures, the fund will have been successful.

The success of any fund seems to depend on the quality of its personnel, and their approach to acquisitions. Ideally VC partners or analysts will have; an in-depth knowledge of the technologies and markets in each target sector; operating skills - senior general management experience in each target sector, and; private equity skills - expertise in financial structuring, small company development and liquidity generation.

In general, successful funds are also diversified; across a number of industries, and over a range of different stages in company development. A company that is struggling might be purchased at a cheaper price, but may also require a new management team, increasing the risk of failure.

8.2 Why venture capital is important

Small companies might have a great idea but don't have the management expertise or the capital to take the product to market. Large companies may be interested in purchasing the small company, but only if the technology is directly applicable to their business model and only if they are looking for an acquisition. Traditional capital markets don't generally like the risk.

So without a strong venture capital market (New Zealand up until recently for example), many good technologies or business concepts fail, not because they won't work, but simply because they were never given a real opportunity to succeed.

A sound VC industry provides much of the fuel to help convert innovative small businesses into large enterprises or businesses in their own right – VC is one of the engines of growth.

8.3 Three VC models

8.3.1 Ampersand Investments and Proteint

Ampersand, a traditional privately-owned VC company, was founded in 1988 as a spin-off from a larger company to focus on investing specialty materials and chemicals. It has grown from a small base to a point that it has just closed its most recent fund for US$300 million. Some early success saw them branch out into information technology, life sciences and communications.

Ampersand seems to make fewer, larger investments than similar companies. They average only five new investments per year and include only 15 companies in any single fund – priding themselves on the attention they pay to their companies and the sectors in which they operate. The Ampersand team also talks of *making* successes, not *picking* them. A further feature is that they tend to hold their most successful investments for a long time (five years versus a more typical three years).

Ampersand invests in companies at all stages of development, including special situations—e.g. turnarounds and spinoffs of non-strategic corporate businesses—where specific domain knowledge and the ability to step in temporarily as part of the operating team are key.

8.3.1.1 Proteint

Proteint, a company owned by an Ampersand investment group, is based on smart membrane separation technology and delivers high value whey and Soya proteins as ingredients and into a recently developed consumer packaging business. Proteint relies on unique technology and know-how and speed-to-market. That is, Proteint relies on speed of development rather than IP to protect their competitive position.

One interesting factor with a company that is owned by a venture capital fund; when the fund matures they can become a weak seller. Proteint will be for sale in 2005.

8.3.2 BTG

By contrast BTG (originally called British Technology Group) is a science based VC / technology development company listed on the UK Stock Exchange. Their business model is to finding and developing business opportunities at a very embryonic stage.

BTG's strategy is to create commercial returns from the research outputs of universities and companies. They help company's bridge the gap between invention and commercialisation by providing patent, technical and commercial platforms for transforming scientific and technical ideas into market leading products.

BTG's aim is to find innovation in a particular scientific or technical discipline protected by a strong portfolio of intellectual property. BTG adds value by investing in further technical development, enhancing the scope of the IP and by selecting the optimal route for commercialisation. This could be by selling licensing rights or developing business ventures prior to attracting third party investment.

BTG limits themselves to the physical and life sciences with a targeted focus on aging and neuroscience. As a result of their acquisitions they hold an astonishing 4700 patents and applications in around 300 technology families. They have some 270 licensing agreements. According to their management they target a diversified portfolio of IP and concepts to create a diversified investment.

Other business services include licensing support and assertion, and providing patenting, legal, financial and business development skills to start up companies.

According to BTG, Intellectual property is the sustainable way of creating competitive advantage; brands are difficult to maintain; being a technology 'first mover' can create an advantage, but that is less likely given the impact that the internet is having and the speed at which competitors can copy the business concept; providing a high quality service or pricing lower or by having outstanding design.
But the only really defensible advantage that can be sustained is that provided by intellectual property.

8.3.3 Binary Venture Capital

Binary Venture Capital (BVC) was formed by 8 Directors and a Managing Director in 1999 – some of the investors in this business are entrepreneur-farmers.

The focus of BVC is to provide angel or early venture capital. Their business plan is to make small but relatively high risk investments.

As a relatively small company, they have capital of approximately US$10 million. To date they have made 12 investments, 5 of which have been successful. Success is not always clear cut – for example the investment in a company with a system to certify second-hand airbags (safety devices for use in cars) for reuse. A new airbag costs $650 - $700 to manufacture and the EU has an aspirational directive to recycle 90% of parts by value. Whilst a promising idea, at the time of writing the EU still needs create legislation that will allow reuse and endorse the certification process.

A further idea is Super Brands. The business idea is to invite opinion leaders to consider the best brands in a country – then invite the brand owners to support the a

"super brands franchise" by providing their brands story. The outcome is to produce a glossy book that those businesses can send as a gift to their customers. From a producer's perspective the idea seems difficult to comprehend; however it will make a $7 million profit in 2003.

Some key lessons learnt through this business venture have been;

- It is key that the venture capitalist / funder provide more than just funding. Normally the recipient company requires both funding and business expertise. Business mentoring therefore is critical.
- They found out opportunities via advertising initially; then from contacts once the VC business was established.
- The return on investment has been 500%, but high input has been required.
- The 'My Baby Syndrome' exists. The inventor will often make heroic assumptions which need to be assessed realistically.
- In a start-up company there are demands at all levels – these demands often result in the management team's failure. They get stretched but don't want to invite more capital in too early because will dilute value. Reality is that success is more important than whether an inventor's ownership share is 30% or 40%.

9 Innovation tools

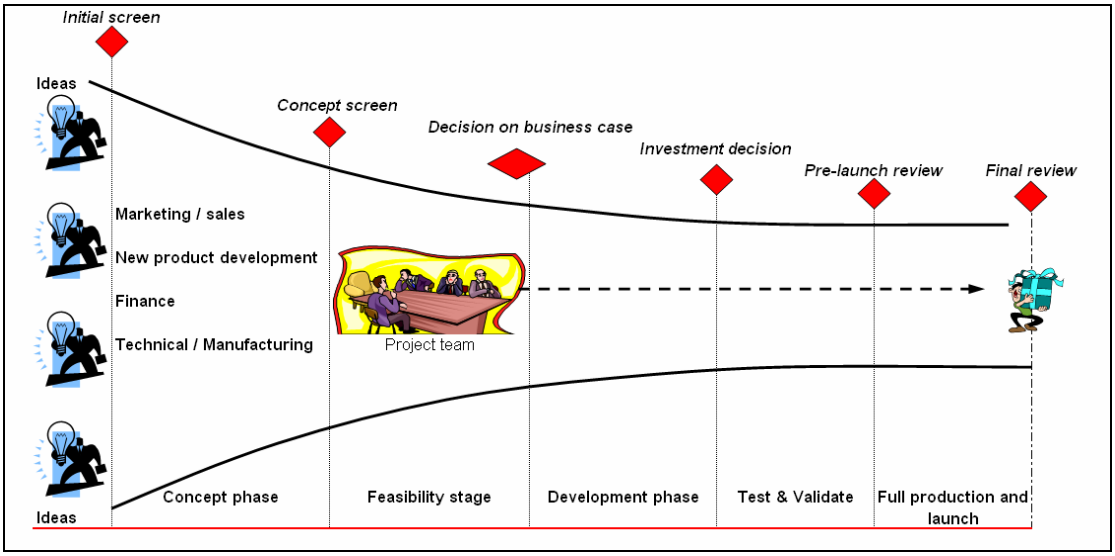
9.1 The innovation pipeline

The innovation pipeline is a commonly used term for the process described graphically in the following figure. The concept is that ideas relevant to the company are subjected to progressively tougher decision hurdles before ultimate acceptance; when an investment to install the new technology, or launch the new product, is made. Within the food industry, it would not be uncommon for 100 ideas to result in 3 – 10 projects that reach completion – with the other projects being discarded or shelved along the way. The decision rationale that guides project acceptance will include strategic fit (relevance to the Company's strategy and competencies), market relevance (i.e. the size and attractiveness of the market and the possible profitability of the idea[9]), competitive position (if the idea is hard for a competitor to match), and degree of risk (technical, financial or market related risk). At least in theory, the better the quality of information used in the decision process, the better the quality of decision making.

Small projects may be subject to less rigour, but the higher the risk/return the more closely the process will be followed.

In terms of the subject of this paper, the innovation pipeline is an integral part to the innovation management process. Superior management will result in a pipeline that is full of quality projects which in aggregate provide short, medium and long term growth opportunities for a company. A quality process will result in the right mix of rigour and speed and may result in some ideas being spun out of the mainstream of the company's activities, either to start-up ventures or to other companies via selling patent rights or a license to exploit the patent. A quality process should result in a superior return in profits per unit of spend on R&D.

A more detailed look at the innovation pipeline, in the context of a FMCG company, is included as an attachment to this report.



[9] Or the size of the cost saving to the manufacturing or service delivery process

9.2 The Market Lifecycle[10]

It used to be that companies would determine their innovation strategy based on their core competencies – pick the things that you are best at and focus your resources appropriately. But sometimes being best at something doesn't deliver sufficient returns – if competitors can copy you or the competencies don't drive purchasing behaviour.

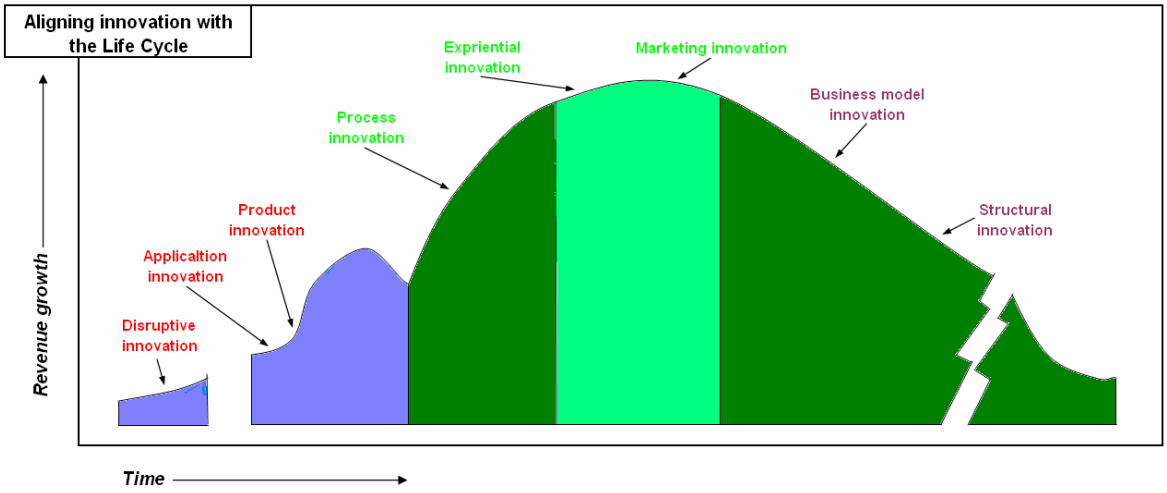
A number of companies are focusing on the different innovation strategies that are appropriate at different points in a market's life. By recognising this, managers can bring different innovation resources to the challenge for competing for revenues and profits.

The first part of the lifecycle is dominated by technology adoption – disruptive, application and product innovation help create the new market category. This stage is about discovering a new product, taking that product into new markets and developing the product so that it continues to meet customer expectations.

Once the market reaches a certain level of maturity (it is becoming commoditised), continued investments in product innovation are unlikely to yield satisfactory returns on investment. Rather than rewarding a company for better products, customers will reward cheaper (process innovation), easier or better to use (experiential innovation) and easier to access (marketing innovation). These strategies can be used separately or together to gain incremental improvements.

At some stage the market will enter a decline; business model and structural innovation still present some opportunity. A company may chose to merge or acquire a player in the value chain for example.

Figure graphically represents innovation strategies applicable to the market lifecycle.



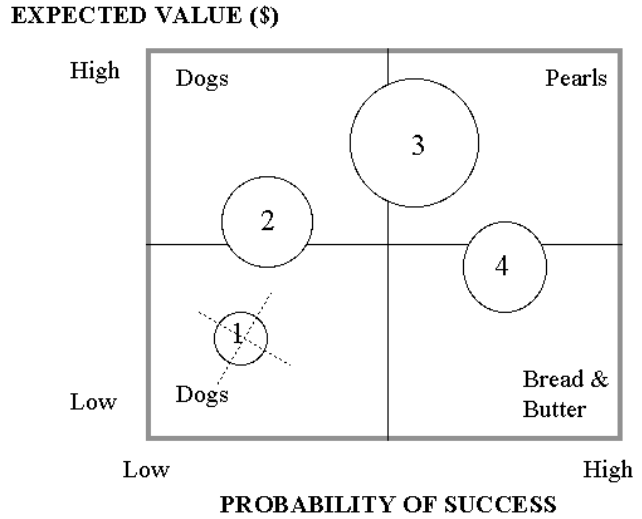
[10] A number of company's interviewed use the product or market lifecycle concept to guide investment decisions; this part of the report has drawn extensively on Moore, G.A. (2004). Innovating within established enterprises. *Harvard Business Review,* July – August 2004.

Within the food industry, clearly people will still eat food. But their preferences change according to demographics, their socioeconomic status and the latest taste or diet fad. The lifecycle suggests that unless a new product can be disruptively created (perhaps backed by a health benefit), most innovation efforts are best focused on process, experiential and marketing innovation.

9.3 Portfolio analysis

Innovation rarely occurs with one product – it is therefore important to utilise tools that analyse the balance between risks and returns from a portfolio of products. One way to do this is to analyse and represent projects according to 2 or 3 meaningful variables. A range of matrices have been included in attachment x; two analysis tools have been included by way of example. To complete, the innovation manager will examine each individual project, then place each project within the matrices according to the variables being considered.

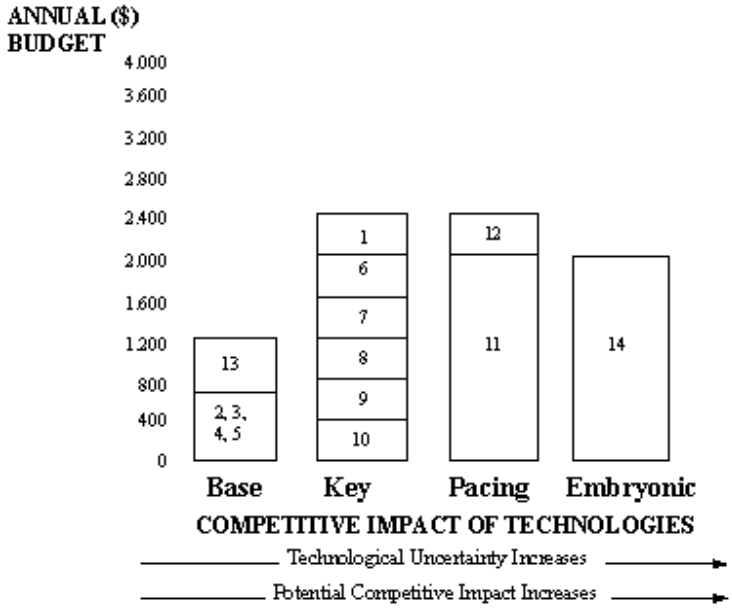
9.3.1 Matrix: expected value x probability of success



Expected value	The expected return that the projects can provide over a period of time, usually in financial terms.
Probability of success	The probability of achieving the objectives. It is a combination of both the probability of technical and commercial success.
Resources	The amount of resources allocated for a specific project/product. It is represented by the area of the circle.

This matrix shows that efforts should better concentrate on those activities with high probability of success and high expected value, although this is not always possible. For those activities with low probability of success, an analysis should be made on whether the expected return is worth the risk involved. In the example, project 1 should be better terminated and project 2 should be carefully analysed. At the same time, it is always interesting to have a pool of projects like project 4, which in total ensure a steady stream of returns.

9.3.2 Matrix: annual budget x competitive impact of technologies



Competitive impact of technologies	The position of the company's technologies relative to its market competitors • Embryonic: very new technology, on its infancy • Pacing: potential to change the basis of technological competition • Key: embodied in products and processes, differentiated in leading companies • Base: essential, buy known to and practiced by all competitors
Budget	The amount of resources allocated for each type of technology, on an annual or life-time basis

This matrix gives a view of the situation of a company's portfolio (products 1 to 14) according to its annual budget. It is remarkable that as the technologies are more unknown the budget involved for a product or project often increases. With the portfolio shown the company may not be securing its current position as the budget devoted to key technologies is distributed among a set of small projects, while betting too much on new technologies. A redistribution of resources among technologies could be considered.

10 Governmental support of innovation

10.1 The theory supports an innovation economy

Michael Porter, a famous economist and business guru has produced the following "Diamond model of competitive advantage". Innovation appears at several levels of his model as intellectual property protection, specialised research and training providers and a range of factor contributions including basic research provision.

Context for firm strategy and rivalry	**Demand conditions**	**Related and supporting industries**	**Factor conditions**
⇒ Competition rules ⇒ **Intellectual property protection** ⇒ Intensity of local competition ⇒ Anti-trust policy	⇒ Regulatory standards ⇒ Environmental regulations ⇒ Home demand sophistication	⇒ Quality of local suppliers ⇒ **Specialised Research and training providers** ⇒ Cluster linkages	⇒ **Supply of scientists and engineers** ⇒ **Quality of Research institutions** ⇒ **University-Industry research collaboration** ⇒ **Venture capital availability**

Clearly, if New Zealand wishes to close the much-publicised gap that exists between average incomes in Australia and New Zealand, an innovative economy may well be one of the key drivers.

10.2 The NZ case – some questions

The following summarises the situation in New Zealand;

- R&D intensity, with R&D spend at 1.2% of GDP is low at half the rate of the OECD average. But we also have an economy without pharmaceuticals, aerospace, ICT, or significant investment in electronics – sectors that have traditionally invested heavily in R&D and are associated with high R&D intensity. We need to consider seriously what level of intensity is appropriate for a biologically based economy?
- The proportion of R&D funded by the private sector is low relative to other countries. Is this because of the commodity nature of the majority of New Zealand's exports, or because of the number of SME's as part of the NZ economy? Is this an issue and how should it be fixed?
- We have similar numbers of researchers per 1000 employees but only spend 60% of the OECD average per researcher. Is this because of low salaries or poor resourcing? Can we produce good research under these circumstances?
- New Zealand has a record of being granted only 0.08% of triadic patents (patents lodged in Europe, the US and Japan), relative to 0.11% in Ireland and 0.62% in Australia. This appears to show that little of NZ R&D results in substantive patentable intellectual property. Is this an issue?
- Europe has a stated intention to increase R&D expenditure to 3% of GDP. Does this imply a relative increase is required in NZ? An OECD report suggests an additional 500,000 – 700,000 scientists will be required to fulfil this role – what will be the impact on NZ's ability to attract and retain scientists?

10.3 Some recommendations

The New Zealand government clearly has a role in supporting an innovative economy, and within that, an innovative agricultural sector. In this regard, government has a mandate to act for public good to;

1. Deliver quality basic research that supports decision making. For example, the status of NZ soils, their ability to perform under intensive agriculture, and their changing properties over time will help agriculture to meet societies increasing environmental expectations.
2. Deliver basic research that supports NZ's distinctive competencies via centres of excellence and R&D funding choices. Since the early 1990's the level of investment in basic agricultural research has declined, both in real terms and as a proportion of GDP or GDP contributed by agriculture.
3. Promote innovation in Small and Medium Enterprises (SME). These form the back bone of the NZ economy, yet we struggle to convert our small businesses into medium and large business; at least part of which is due to inadequate commercialisation of R&D. Whilst there are some programmes available, they are not sufficiently targeted or resourced. Given that NZ at its heart is a biological economy, there should be a focus on supporting agricultural SME's looking to utilise innovation to add value.
4. Promote tech transfer where there are insufficient industry or commercial drivers and economic needs are identified.
5. Promote university and CRI – industry partnerships.
6. Ensure society supports and values innovation. This is a sociological issue that needs to be addressed via curriculum and careers advice at schools.

11 Personal conclusions

The essence of any Nuffield Scholarship is the journey taken by the individual scholar; particularly in terms of their 'learning' and personal development. However, the requirement to deliver a formal report ensures the scholars diligence and is also a payback to the supporters of the program.

In this scholar's case, the learning was far wider than the specified topic, as evidenced by the attached articles published in the NZ Dairy Exporter.

Despite this broader and perhaps less targeted approach to my study I learnt that:

- The world is incredibly competitive. In many ways we lead a sheltered life here in New Zealand.
- The drive to commoditise is relentless.
- Great companies have a clear vision and constancy of purpose.
- Successful innovation delivers profit and business growth. Great ideas must become great concepts, must have a great business plan and must deliver new products and services to the market.
- Strategy and process appears to be more important than structure.

Being a 'Nuffield' was a privilege – one I hope many successive generations of NZ farmers can apply for and benefit from.

Attachment - Danone

Andrew Watters 728 Taonui Rd, R D 5 Feilding New Zealand awatters@xtra.co.nz +6429 4406605	***Case Study – Innovation management*** Date of visit : 30 / 4 / 04
Company name	Danone Vitapole – Danone's Research arm
Name of contact Position	Denis Paquet – dpaquet@danone.com Vitavaleur: Research group leader – Milk
Brief company description (2002)	Total company sales €14 billion, €6.3 from fresh dairy. Self stated as No 1 world wide fresh dairy. 9.5%/annum growth in Danone brand, 6% organic growth p.a. for company. Operating margin 11.7%. 92,000 staff, 194 processing plants. Fresh dairy = yoghurt, fromage fres, fermented milk.
Theme 1	In fresh dairy, Danone has a very focused area of expertise and research potential. They aim to be No 1 in their market, and claim to sell 70% of their products through a No. 1 position in the relevant domestic market. *It is easier to be world number one in a tightly defined area….*
Theme 2	Danone have a structured approach to R&D, which includes an apparently dispassionate, risk based assessment of likely project success. *Whilst a tight project management structure may result in lost opportunities, it probably results in a better overall return on R&D.*
Theme 3	The Danone business is an ideal one for a specialty ingredients supplier to get alongside. *Does Fonterra's new product mix weighting (to powder) reduce our proportion of product able to be marketed as specialty ingredients? Has this been accounted for in capital decisions? Are there not strategic reasons that we should continue to develop our specialty protein capacity / products / business?*
Objective of R&D	"Through pioneering spirit will create and secure future access to products that consumers choose for their health and nutrition and prefer for their taste" Science role to: ⇒ Ensure quality of products, especially at launch of new products ⇒ To provide legitimacy to scientific claims

	⇒ To explore and develop new product opportunities ⇒ To be a catalyst for change ⇒ A guardian of Danone's scientific know how. Their "headline" customer service objectives from R&D are; 5. Active health; reinforce the Danone image of products with a health benefit 6. Nutrition; to follow good nutritional health practices 7. Preference; measured as superior to competitors for customer choice 8. Technology; harmonise processes around world (SAP), improve time to market and world-wide roll out and, improve cost effectiveness. *"For Danone, R&D, particularly in the health and nutrition area, is becoming a larger part of the company's growth strategy…."*
R&D concept (See attached spreadsheet)	<u>Sensovaleur</u>; aligns product and packaging with customer preferences Seeks to understand; customer preference drivers; physiology of taste; routes for adapting / modifying product. In terms of new R&D, the focus is to understand consumer perceptions and expectations. Team works with private institutes, consumer panels, and other markets. Work profile; ⇒ Understand full sensory profile of product (texture, smell, taste) ⇒ Understand consumer preference ⇒ Quantitative research to describe range of behaviour and perceptions that drive consumption ⇒ Determine physiology of taste to explain taste perception of products; therefore create a sensory advantage ⇒ Trend analysis to find new flavours and functionality in future demand *(It is expensive for Danone to launch new products, the company must get it right)* <u>Technovaleur</u>; has a technical improvement role ⇒ Improve productivity ⇒ New manufacturing processes ⇒ Expert in strategic part of processes (e.g. mixing technologies) ⇒ Runs simulations of all processing techniques of the group prior to pilot. (e.g. texture or pottle strength) ⇒ Manufacturing control through statistical process control ⇒ Process modelling <u>Nutrivaleur</u>; health and nutrition. Functions are to provide nutritional guidelines for main brands, to conceive and implement R&D strategies whose results allow claims, to build a scientific dossier for regulatory and communication purposes, and to communicate scientific results to the (scientific) community. Focus areas: ⇒ Intestinal health*[15 years] ⇒ Eating behaviour / energy metabolism*[2 years] ⇒ Cardiovascular disease and antioxidants ⇒ Immunity*[5 years] ⇒ Bone metabolism ⇒ Cognition and stress * products offered

	Vitavaleur; best raw materials ⇒ functionality of starters (trying to build an exclusive differentiation factor) ⇒ new textures, probiotics, starters ⇒ functionality of raw materials to facilitate their use by product development ⇒ capture and characterise external offers of innovation on plant and milk ingredients (Fonterra's relationship fits here)
Project management (See attached spreadsheet for "Danone Goose-map") (See attached risk template)	1. In fresh dairy have approximately 70 projects currently, with mix of timelines for delivery (some with 5 years plus). Try to run only 2 – 3 long term nutritional projects – phase of selection is very important. 2. Each project has a client (the target customer and leader), a project leader (scientist), coach (specialist project manager), a project team staffed with the relevant staff from across divisions. Resources / priorities and go/stop decisions are made the steering committee. 3. Project has an objective (and context), deliverables, allocates responsibilities, allocated FTE staff resources, a budget for external contractors, and an overall budget. 4. Actions are planned for the timeline of the project, including the inter-relationships with other relevant or dependent projects. 5. Steering committee takes a very active role in risk assessment – "and won't hesitate to stop projects" Formal risk management assessed each time for every identified risk. Ask the questions, "what is the risk", "what can we do", "who will do it", "by when". Complete the attached risk template for each item.
R&D Structure	⇒ 60% of Danone R&D completed at Danone Vitapole (30,000m2, 1/3 lab, 1/3 pilot plant). ⇒ Total cost of R&D 2002 was €133 million, 0.95% of sales. 250 scientists, 200 engineers, 100 support staff. ⇒ Work with 20 universities on collaborative work – animal models, human clinical trials etc. "Where have knowledge in a specific domain. ⇒ Run symposia on pro-biotics, just started supplier innovation day.

Creating a new snacking category – a cheese snacking product for adults

Trends;

⇒ Existing cheese spreads business declining

⇒ In past five years, adults have 15% more disposable income, yet are working 4% more hours.

⇒ Consumers are increasingly prepared to pay for the convenience & portability of food designed to be eaten on the go in response to growing time pressures

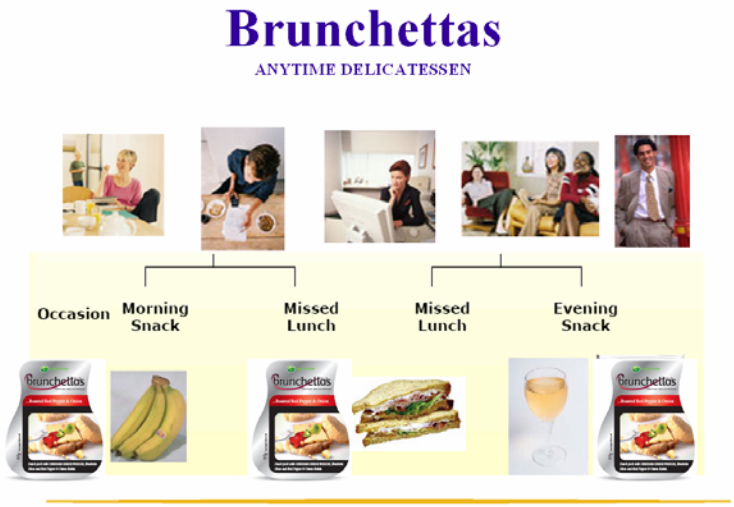
⇒ As consumers move away from formal meal, an opportunity exists to develop products that replicate meals but in a hand held format

The UK snack market

⇒ Total UK Snacks Market £11.5 Billion
- Chocolate and confectionery £6 Billion
- Bagged crisps and nuts £2.3 Billion
- Sandwiches £3 Billion

⇒ Total UK Kids Cheese Snacks £143 Million

⇒ Total UK Adult Cheese Snacks Nil (£3.6 Million)



Why consumers purchase a snack

⇒ 35% convenience, 25% taste, 9% no preparation, (5% low fat)

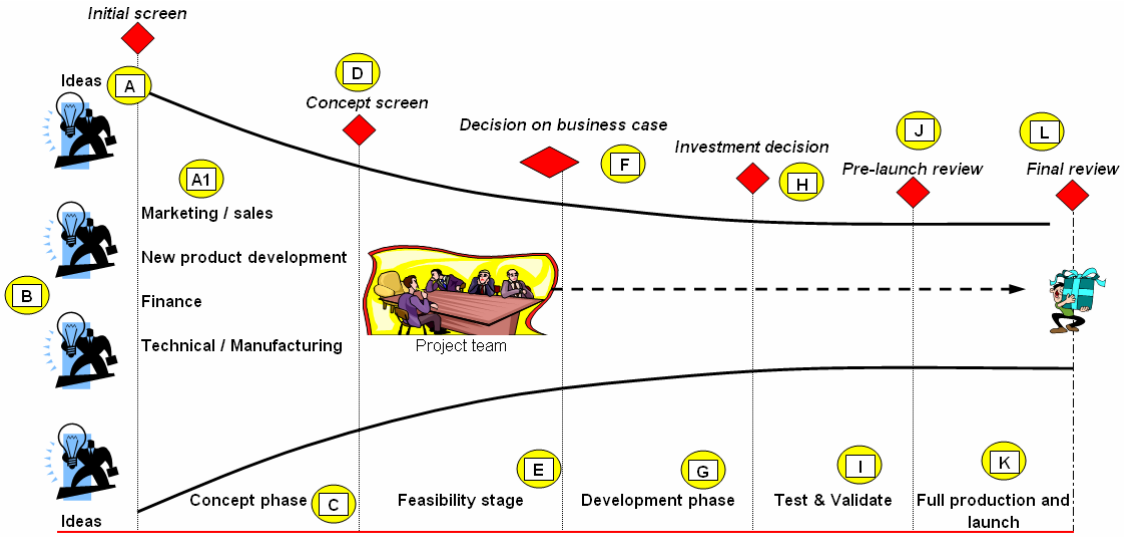
Outcome; Brunchetta's

⇒ Distinctive Brand Identity

⇒ Designed to Pioneer the Category and Drive Consumer Interest
- Three years of research.
- Approximately 1M Euro in the adult snacking concept.
- 2M in Capital Expenditure (this includes a new snacking production line in a high/low care facility).

⇒ 10M Euro in marketing costs over next three years

Example of an innovation process for a branded food line



A1. The people

Each project should have a client (the target customer and leader), a project leader (scientist), coach (specialist project manager), and a project team staffed with the relevant staff from across divisions. Resources / priorities and go/stop decisions are made the steering committee level.

A. Idea generation

New ideas can be sourced from Trade shows, magazines, conferences, literature reviews, consumer research, the internet, store or market visits, brainstorming sessions. New ideas can come from employees, customers, suppliers, and partners.

Once a new idea has been identified it should be documented, be logged in a database, and be subject to a screen review. The review will screen the idea against suitability criteria with a GO/KILL/HOLD/RECYCLE decision.

The idea originator should be part of the process and informed of the outcome. A project manager and relevant sales or technical manager conduct the initial screen.

B. Idea / project categorisation

Category 1 projects are new to the business and to markets, are high risk/high return and are required to go through every stage of the innovation pipeline with decisions made by the full steering group.

Category 2 projects are new to the company but not entirely new to the market, are brand or account development products with investment implications. These projects can go through a merged concept and feasibility process, and are reviewed by the steering group from the review on the business case forwards.

Category 3 projects may be a technology or product extension with minimal risk. Concept and feasibility stages can be merged and need only be reviewed by the steering committee at the investment decision stage.

C. Concept phase – the tasks

The concept phase is desk-based research that addresses Technical, Marketing and Financial tasks.

Technical tasks assess product requirements, manufacturing requirements and technical risks. Marketing defines the product, its market attractiveness, the possible product acceptance and considers the competitive situation. Finance conducts a capital investment appraisal and projects a possible profit and loss.

D. Concept screen

What is the project's strategic fit? How well does the project fit the company's strategy in this area? How attractive is the market? How well will the project support the company's competitive advantage? What is the probability of technical success?

Conducted by the project team and the steering committee.

E. Feasibility stage

Project manager finalises roles and responsibilities of project team and develops a project plan. Detailed market and technical assessments are developed and considered by the project team. If these are acceptable, the financial assessment is completed and a decision is made to go to a decision on the business case.

F. Decision on business case

Detailed report addressing status of project, the overall recommendation, strategic fit, market attractiveness, competitive advantage (unique selling proposition) and risk assessment. Decision to go, and then agree project plan, project team, financial requirements.

SCORING MODEL										Average
Strategic fit	Very poor	1	Poor	2	Average	3	Good	4	Very Good	5	
Market attractiveness	Very low	1	Low	2	Medium	3	High	4	Very High	5	
Competitive position	Very weak	1	Weak	2	Average	3	Strong	4	Very Strong	5	
Technical risk level	Very low	1	Low	2	Medium	3	High	4	Very High	5	
									Total		

1. If total < 12.5 the the project should be killed

2. If project is > 15 then the project should proceed to next stage

3. If in between, the specific reasons need to be identified, discussed with a concensus view reached.

G. Development phase

A detailed phase considering technical, marketing and finance tasks.

Technical; produce equipment specifications, determine any impact on existing manufacturing operations, validate the production process, produce product specifications, determine health and safety issues, produce CAPEX documentation, determine manufacturing requirements, consider manufacturing outsourcing, determine HR requirements, consider logistics requirements.

Marketing; review and validate marketing output from previous stages, develop any concepts in branding, carry out qualitative research, refine concepts, conduct quantitative research, obtain sales force feedback, determine funding availability, produce product marketing plan, produce communication plan, determine resource requirements, design packaging.

Finance; prepare detailed CAPEX, P&L account, and cashflow forecasts. Complete capital expenditure proposal and capital expenditure appraisal, budget for development phase.

H. Investment decision

Include; sales reports with proposed volumes, marketing information and research results, technical reports, manufacturing reports, logistics reports, engineering reports, financial reports, test and validation results, proposed HR requirement plan, CAPEX request forms, manufacturing flow. Have a prototype product, a proposed project plan for launch and mock up packaging. Determine a critical path for the rest of the project. Go / Kill / recycle decision.

I. Test and validation

HR; recruit staff, training. Finance; validate financial analysis, design appropriate product performance matrix. Technical; purchase and install plant and equipment, complete supplier audits, commission and validate equipment, procure packaging, procure raw materials, plant scale up, product approved by project team, produce

HACCP documentation. Marketing; sales force briefing, trade and product launch, determine trade reaction and quantify attainable listings, finalise advertising, promotions and PR materials, determine market tracking plans.

J. Pre-launch review

What is the critical path? What issues require addressing?

K. Full production

Project team to meet weekly. Compare production samples with market approved samples, review actual versus forecast demand, product performance report (4 wks after launch), market tracking feedback, and review production planning and order fulfilment process.

L. Final review

Facilitated agenda; total review of project from idea generation to product launch, review project against project performance indicators, review of team performance, agree dates for formal handover of project.

Potato case study – adding value at Tesco's

The Jersey Islands are a traditional source of new season potatoes (Jersey Royal) available in the early season, April and May. They were traditionally sold as an unwashed product.

The innovation to this traditional product line has been to convert the market from an unwashed 'select you own' potato product, to a differentiated, washed, long shelf life, convenient and branded product. Tesco's now have a 37% market share of the new season potato market (relative to their 27% share of the fresh vegetable market). Tesco sells 2 million units of Jersey potatoes packaged as shown in Figure 1.

Key innovations are summarised below.

Washing potatoes; ensuring that the crop was free of disease and that an appropriate washing process was in place allowed more convenient and attractive washed potatoes to be marketed, whilst retaining an adequate shelf life.
Selecting a smaller potato size; allows potatoes to be efficiently packed in punnets or smaller bags that reflect consumers' desired purchase size – and reduces cooking times.
The emergence of revolutionary packaging; featuring an attractively sealed punnet (Figure 1) or 'pillow bag', airtight other than laser perforated film that is designed to optimise shelf life through maintaining an optimum concentration of oxygen and CO_2.
The automation of the packaging process; the equipment that packages the product also has resulted in significant automation and efficiency gains to what was a labour-intensive process. In return for some contract guarantees, the supplier has invested in a new site and the new equipment required and have benefited, along with Tesco's, from a reduction in fixed and variable processing costs.

Tesco's is an innovation driven organisation focused on leading (and dominating) the fresh produce category. This particular innovation was achieved by employing staff specialist in the agronomy and physiology of potato production; from working across disciplines by looking at technology in use in the packaging industry; from being prepared to underwrite the project through providing the supplier with a long term contract, and; from having a 'can do' attitude in addressing issues that arose through the process – emphasising the necessity for continuous improvement.

Helping SME's innovate

Aim is to provide everyone with sufficient understanding to enable them to make an informed choice between employment and enterprise.

Build an enterprise culture

⇒ Facilitate the routes from a benefit to self employment

⇒ Promote better awareness of funding and support available

Will measure by the increase in young people taking part in enterprise awareness; the proportion of people (young etc) considering going into business and; the proportion of people considerinmg business that consider themselves sufficiently aware.

Encourage a more dynamic start-up market

⇒ Launch a 'core offer' program – a nationwide level and standard of service that start ups can access via Business Link

⇒ Council of graduate entrepreneurship, focusing on gaps in current courses and information, training on business start up skills in subject curricula, to provide extra-curricula training and investigate the barriers to new graduates starting up their own business.

Will measure by; the productivity of new business; increases in the proportion of SME's seeking advice and; reductions in the barriers to start-up.

Building capacity for small business growth

⇒ Adopt outcomes of innovation review

⇒ Management and leadership program in a way that results in demand led provision that focuses on informal learning

⇒ Roll out DTI's business support products, ensuring the programs that support innovation and best practice are promoted.

Success; proportion of business reporting that they want to grow their business and are able to do so; number of business actively involved in product and process development and; take up of external business advice.

Improving access to finance

⇒ Develop an enterprise capital fund program to increase availability of growth capital to fund SME's affected by the equity gap. Start with a pathfinder project.

⇒ Review SME loan guarantee to ensure SME's are able to access finance

⇒ Focus on improving financial knowledge and skills

Success; reduction in business reporting difficulty finding access to finance; increase in the number of equity investments in start up business and; increase in capital investment by small business.

Encourage more enterprise in disadvantaged communities

Improve SME's experience of government services

⇒ Build business link as the generic, customer facing brand

⇒ Join the channels to the SME customer to reduce waste, duplication and unnecessary duplication
⇒ Look to develop a single plan for delivery of service to SME's
⇒ Build the Small Business Service as the national centre of excellence.

Success; improved customer satisfaction ratings; improvement in business link market penetration and; improvements in small business perceptions that their concerns are being considered.

Developing better regulation and policy

⇒ Limit timing of the implementation of new laws to one or two days per year.
⇒ Focus on measures to reduce compliance costs for SME's
⇒ SME procurement concordat

Success; reduction in the % of SME's citing regulation as an obstacle to growth; maintain position in terms of international comparisons of business burden; increase in awareness of sources of advice; reduction in levels of crime and more SME's are successfully competing for public sector contracts.

Nuffield at large…. The record of a New Zealander traveling north

In early December I was delighted to be awarded a Nuffield Farming Scholarship – a unique program which allows farmers to travel overseas, to obtain an understanding of the structure, business and politics of farming and some of our main markets in the Northern Hemisphere, and to undertake a personal study topic.

I am away from home for five months, leaving my wife Alison and two daughters Bridget (7) and Jaime-May (4) behind. Not easy at all, but an opportunity for us all to learn new skills.

A challenge for the good team of staff we employ as well.

The initial tour this year lasts six weeks, started in New Zealand, then included California, Colorado, Washington DC, Ontario – Canada, the United Kingdom, France and Brussels, the capital of the European Union. For the first five weeks the tour party is two New Zealanders, eight Australians, one Canadian and a Frenchman. The last week we meet up with a further 22 UK scholars.

I am writing this looking down on a patch work quilt of farmland – the green here and there dominated by the brown. We have just finished a 90 mile an hour (speed that the traffic flows) tour of agriculture in California and Colorado, next stop Washington DC.

By most standards, farming is good in the USA. Subsidies for key products, an abundance of water, at least in California, access to cheap labour and the opportunity to expand are all positive features.

Subsidies appear to apply to a number of products in different ways. For rice they have a minimum price per kilo produced – this price is sufficient to ensure that in an average season growers will make a profit. Just imagine if our minimum price was $4/kg milksolids and you will get the idea. By comparison, dairy farmers are supported by an intervention price for milk products. When prices fall below a certain level the government steps in. In this later case, the price support doesn't necessarily mean farmers will make profits – but the system does help set a floor to the price farmers receive.

Whilst access to water is becoming more difficult in California, they still don't really regulate the taking of subsurface water! And if the urban community has an unmet need for water (3500 Ha of land is being gobbled up in new housing development every year), farmers can sell their water rights quite lucratively.

Our difficulties in New Zealand with finding staff are a world away from the situation in North America. In the USA they have very good programs for supplying relatively cheap but hard working Mexican labour ($NZ9 - $NZ10/hour). We didn't meet a single dairy farmer that actually spent much time milking cows themselves!

Right now, dairy farming is very good in California. We visited a 3000 cow dairy in Northern California established two years ago. The road to the farm had the biggest pot holes I had ever seen – the previous land use was combinable crops (wheat etc). Now, in only some 6 to 7 years the stretch of about 8 km of road is home to over 120,000 cows and has a steady stream of milk tankers and huge trucks transporting feed (the hay comes from over 120 km away).

Current milk prices are approximately $7/kg milksolids using a rough conversion to NZ prices. Last year the price was closer to $4.6/kg milksolids and the farm we visited was losing $100,000 per month at that price. Although things are buoyant now, all commodity goods are doing well so they have the familiar problem of increasing bought in feed costs – and this is an issue because feed represents 50 - 54% of their total costs and is not cheap at 30 - 35 cents/kg dry matter on average.

The lift in milk prices seems to be as a result of simple supply and demand economics. On the milk supply side, there has been a loss of farms in traditional dairy areas. As well, the majority of dairy farmers contributed to a milk production buy out scheme – an incentive system for farmers to reduce milk production on a one off basis. And finally, for some reason Monsanto has removed BSE (a hormone that increases milk production) from the market which reduces potential per cow yields by 8 – 15%. On the demand side, all the news is about how the world economy is picking up and there is an increased demand for protein products again. For example, current wheat stocks are at their lowest for more than 10 years. Encouragingly, Soya beans, a major substitute for milk products is also increasing in price.

If only we in NZ could convert current commodity prices at say a 55 cents US exchange rate I believe our payout would be very buoyant at the moment.

Whilst I have painted a positive picture of dairying in California, there are some significant negatives.

The first is their relatively high fixed cost structure reflected in the cost of bought in feed and the amount of infrastructure needed to house and milk cows. My impression is that for someone with reasonable debt levels they are operating on quite small margins – but that the sheer scale of the business means they run up huge profits or large deficits in quite a short space of time. And because most of their feed is coming from off farm, they have no option but to let their cost structure increase as the price of bought in feed rises.

The second big issue is the rising cost of environmental compliance. Local counties in California are becoming very unsure about nutrient loadings and have stopped any more dairy development in the area we visited until further notice. And they are applying tightening standards for existing farmers with their waste water – effluent disposal.

But whilst in some areas environmental compliance is tight, we visited a farmer near Denver Colorado who wouldn't drink his well water because of high nitrate levels. Yet he was continuing to apply high rates of nitrogen fertiliser and to over water his maize crop. Even the officials with us didn't seem to be concerned!

One final thing to comment about – the communication gap between dairy farmers, their co-operative processors and consumers. Farming is seen very much as a commodity business, the co-ops exist to process the milk and provide a competitive farm gate price, but producers are relatively disinterested in their co-ops attempts to add value. We currently have a much higher level of engagement between farmers and Fonterra – long may it last!

Nuffield at large…. The Politics of Washington, the wealth of farming in Canada

Travelling across the United States and into Canada with a group of eight Australians, a Canadian, another New Zealander (Oliver Saxton) and a Frenchman…. Farmers from North America have a different view of the world. Because they have access to large domestic markets and due to their influence on national politics they have been able to justify subsidy payments….

Washington DC is an impressive place – whether you like current American politics or not. Within a five km circuit it is possible to see the Senate, the Whitehouse and the Washington Monument. When we were there, it rained the whole time, but the cherry blossoms were beautiful.

We had a number of visits in Washington, but three are worth commenting on; a visit to the Australian embassy, visits to farmer representative organisations, and an update on the WTO negotiations on trade liberalisation for agriculture.

The Australian Agricultural Attaché provided a frank perspective; they found their Free Trade Agreement negotiation (free trade is a misnomer) incredibly difficult. Right up to the final signing, Australian negotiators expected some concessions on access to the USA for a politically important commodity, sugar, but without results.

The strong feedback is that currently, achieving bilateral free trade involving agriculture is very difficult. It confirmed for me that New Zealand is not even on the radar for consideration, we aren't friendly enough, we aren't important enough and frankly, our dairy industry is seen as too efficient – they think we would swamp their market. New Zealand is likely to get better results by focusing on the multilateral WTO negotiations.

We met two farmer representative organisations for a perception of American farmers' view of trade liberalisation. The first was the smaller group, the National Farmers Union (600,000 members). They actually welcomed the collapse of the WTO negotiations at Doha and in a newsletter congratulated the USA negotiators for not being 'bullied into an agreement'. Their view is they have a huge and wealthy domestic market and would prefer it to themselves.

The second more important group is the Farm Bureau – with 5.7 million farmer members. They have historically been on the side of free trade, and were so at the Doha WTO negotiations. However, behind the scenes is not quite so positive. At the last round of Farm Bureau meetings the farmer vote for a resolution giving watered down support of trade liberalisation passed by just over 50%.

Whilst farmers support subsidies, the Farm Bureau leadership reported that it is more difficult every year to publicly justify direct payments encouraging commodity production. For example, the recent Farm Bill increasing farm subsidies has taken big hits from public press. Don't expect change soon though!

Despite these gloomy perspectives, we received an update on WTO free trade negotiations that left me feeling very much more positive about prospects for fairer trade in dairy.

On this trip we have found a certain lethargy in the civil servants we have talked to – but one spokesman from the USDA gave us an excellent and positive up date about progress in restarting the failed Doha talks.

You might remember the last talks collapsed because of the differences between the trade position of developed nations (Europe, the USA and Japan) and developing nations (groups called the G21 and G33).

US officials view the recent talks are a far more genuine attempt to find solutions. Tim Grocer, a New Zealander and the new chairman was spoken of favourably.

The trade talks for Agriculture are split into three main areas, export incentives, market access and domestic support.

Export incentives are important to New Zealand because of their negative affect on world prices. And in the negotiations, getting an agreement on the phasing out of these incentives is thought to be possible. Europe is providing new commitments and the US will probably agree that their food aid and export credits programs be subject to reductions.

Both market access and domestic support are more difficult and will require tradeoffs between the parties.

In terms of domestic support (subsidies that farmers receive), the debate is about the amount and the rate of cuts, and will result in farm payments being targeted towards environmental improvement.

Market access is now largely determined by the level of tariffs applying on imported goods – apparently the average tariff level applying to agricultural products is 60%. The negotiations are about the level of cuts and how the cuts are to be made. For example, the USA wants cuts to apply at a faster rate on countries that have much higher tariffs. From the USA perspective, market access is critical to their electorate.

So there is a lot of work still to do, but I left hopeful about fairer trade.

The wealth and folly of being a Canadian dairy farmer

How would you like to earn $9.30/kg MS and for that price to only change based on changes in the costs of production? From what I could ascertain, Canadian dairy farmers are, with the exception of the effects of the recent BSE outbreak, in '7th heaven". It would be difficult to lose money under these circumstances.

We visited a 600 cow dairy farm in Ontario, Canada. The facility was relatively new, but similar to others we had seen – smartly presented barns, a double-up herringbone cowshed, efficient Mexican labour, huge feed bunkers. They had solved their effluent management problems by working in with a compost manufacturer.

Where then is the folly? The 600 cow farm was worth $23 million, about $6 million for the farm, land and buildings, $1 million on stock and $16 million for the quota. Quota is selling at a price equivalent to about $27,000 per cow!

Although in Canada the subsidy is in effect paid by consumers paying a high price for milk, these arrangements will be affected by the current WTO negotiations. You would have to be a brave person to want to milk an extra 100 cows with some prospect of limits to domestic support over the horizon!

Glad to be a NZ dairy farmer

In the UK the original group of 12 Nuffield scholars from the 'colonies' were joined by 22 scholars from England, Scotland, Wales and Ireland. The UK Nuffield scholarship is different than ours – they only have to be away for 8 – 10 weeks (versus 4 – 5 months) and people can apply as long as they are involved in agriculture – this meant that 40% of the UK group were not farmers.

Our stay in the United Kingdom was only five days – but enough to get an appreciation of the issues and problems with agriculture here.

First, consider the differences with New Zealand. UK agriculture makes up 1 - 2% of the country's gross domestic product (GDP) compared to 17% of GDP in NZ. UK farming employs 1.4% of the labour force; in NZ that figure is closer to 5%. Farmers in England have many more neighbours - 2.4 people per hectare, compared to NZ at 0.15 people per hectare. Finally, data shows that productivity improvement has stopped dead in the UK – compared to significant productivity improvements in NZ agriculture over the last 15 years.

British agriculture clearly isn't important any more – confirmed by the fact that the Ministry of Agriculture (MAFF) has now been renamed DEFRA, the Department for Environment, Food and Rural Affairs. As one elderly farmer put it, "Where farmers used to stalk the halls of power, we now hang around at the entrance, hoping to be invited in".

This means that when farmers complain about the government bringing in rules on maximum organic nitrogen loading, meaning maximum stocking rates of 1.7 cows per hectare in Northern Ireland, no one listens. Farmers here are in danger of losing control of their own destiny.

How then is the average UK dairy farmer faring?

We were provided some useful industry statistics that show that the UK dairy industry is not much smaller than ours (figure 1).

In terms of the recent history of the industry, UK dairy farmers have fared relatively poorly; they have suffered falling prices and are now poorly paid – at least relative to their neighbouring Europeans (figure 2). There are probably a number of reasons for this poor situation; one of which is that they are supplying nearly 50 dairy processors; the second is that there are very few co-ops and a third is that the consumer market is dominated by three to four major supermarkets that have a very strong cost focus.

We visited a number of dairy farmers milking 80 – 120 cows during our few days north of London, and were taken by their lack of confidence. There is little idea of how to make high input systems profitable, they had farm equipment that is beyond their needs and their ability to fund, and seemed to have little opportunity to improve the scale of their business because of high land prices ($24,000/ha for bare land) and poor facilities. Expansion will often require a new 'milking parlour', new effluent

handling facilities, new race systems etc. These farms probably represent the average, and their profitability, as shown by the retentions data in figure 3, is poor.

Despite the doom and gloom, we did see two very good farmers. One was making decent profits through operating a low cost grass-based system, although the standard of improvements looked like they would limit the farm system in the future. But encouragingly, there were opportunities for significant improvements. Another was adding value by developing old barns into houses on the farm. The equity he was creating was used to raise additional loans which were, in turn, being invested into a large scale rotary and feeding/housing system. Their aim was to minimise labour costs.

So what about the future for UK dairy farmers? There is expected to be huge changes as a result of the latest Common Agriculture Policy (CAP) reforms.

Under CAP dairy farmers will receive direct farm payments equivalent to NZ$650 per hectare as a subsidy. But on the other side, the intervention prices that used to apply for skim milk and butter will fall by 22% by 2007. In industry magazines the talk is these changes will result in a fall from an equivalent of $8/kg milksolids to $6.50/kg milksolids and that, as a result, 10,000 farmers will retire out of dairy in the next three years.

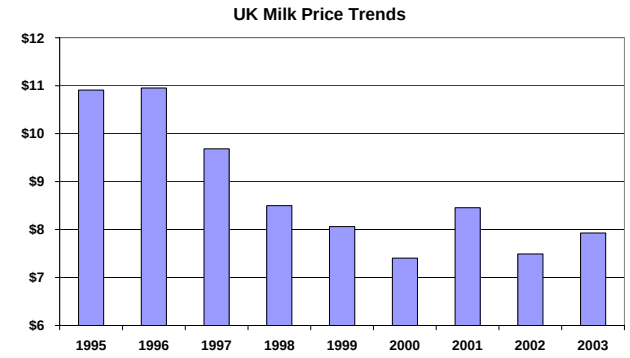
Whilst a price of $6.50/kg MS would appear attractive, their statutory and fixed costs are horrendous.

Those left will need to either adopt the pastoral grazing systems that we are so familiar with, or invest in very efficient large scale facilities.

From a New Zealand perspective, it is mostly good news. Milk supply from Europe will undoubtedly fall which will reduce their exports further and will be good for the world demand for NZ milk products. The bad news is that with the fall in intervention prices the value of our UK quota will probably fall.

Overall, the news is that we should all be glad to be New Zealand dairy farmers despite the short term outlook.

Figure 2. Milk price trends and price comparisons with Europe



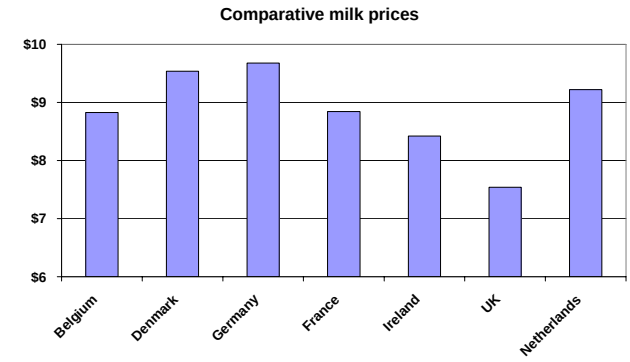


Figure 1. A summary of UK dairy

⇒ Annual production 900 million tonnes of milksolids (vs. NZ at about 1100 million tonnes) from 2.1 million cows

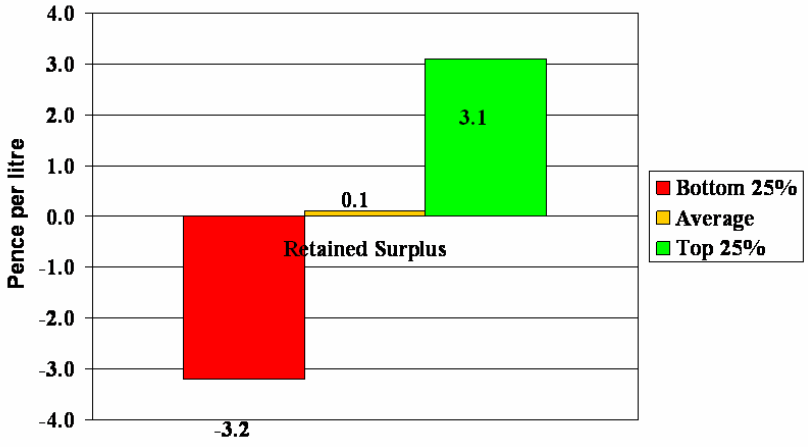
⇒ 23000 dairy farmers milking 90 cows each

⇒ UK dairy farmers supply 95% of dairy requirements for the UK – 49% of which is used for liquid milk.

⇒ 50% of milk supplied to processors direct, 50% to co-ops, but there are a total of 50 buyers.

⇒ Total farm gate earnings $7.8 billion compared to the UK consumer spend on dairy products of $23 billion

Figure 3. The profitability of dairy farming in the UK



Social policy and farming doesn't mix

Yesterday I saw a world-class farm, one New Zealanders could learn from. This was a 3100 Ha market garden business, mainly specialising in fresh greens. They adopted a purely business approach, had professional systems and knew their farming backwards. I saw a breakdown of revenue versus costs on a $ per head of lettuce basis, they were able to discuss the weaknesses in their cost structure and the strategies they were taking to address these weaknesses. In response to customer demands (a very large supermarket) they had implemented full traceability, had purchased and were farming land in Spain to provide their salad products all year round, and had developed an organics business from nothing to provide a 60% share of this customers requirements for organic products.

Yet everywhere else I have seen farms that are too small, that have too much capital employed in terms of plant and equipment, or are just plain inefficient.

What is the difference? The market gardener has never been subsidised, whereas nearly every other farming sector is. Subsidies have created an environment of comfort and a reluctance to change.

In our Nuffield Scholars visit to France we visited the Somme region. The region is dominated by arable agriculture and the graveyards and monuments from World War One.

The French culture is striking. The notion of Farmers' Markets, the selling of locally produced produce to townspeople, is a way of life in both the city and country. People like eating fresh from merchants they personally know - a concept that has been lost from the Anglo-Saxon culture where we have a less intimate relationship with our food.

Scale is a key limitation everywhere. Prices are still good enough that farming 30 cows is worthwhile (approx NZ60 c/litre), providing the assets are depreciated, and that dairy fits in with other enterprises. The issue of scale is ultimately limited by French law – a farmer we visited is unable to farm more than his current 550 Ha. A fellow Scholar from southern France, is unable to buy a 40 Ha block because his father is farming 600 Ha.

As in UK, overall profitability measured in any real terms is problematic. In addition to the scale problems, most farms appeared over capitalised. We saw farmers with less than 40 cows with John Deere tractors.

The infrastructure supporting agriculture appears to be overblown. The network of research stations and extension workers would be similar to New Zealand in the early 1980's.

The French business environment does not support agriculture. A brief discussion of labour laws and on-costs were frightening.

Overall, one can see that there are significant political, cultural and bureaucratic limitations to reforming French agriculture. Whilst they will always retain their unique way of doing things, reform would add real vitality to the rural economy.

Whilst France appears to want to 'keep peasant farmers on the land', the system that has created this 'produce food at any cost' culture was interesting to start to understand.

We found that in Brussels, the headquarters of the EU, prices are high, the offices are small, the people scurry from place to place, eyes down-turned. Is Brussels the ultimate home of the nameless bureaucrat? Frankly we saw everything bad about having too much government in people's lives.

From three or four visits we finally understood how the business of the EEC appears to be formed:

⇒ The Council of Ministers, nominated to the EU by member countries, makes decisions on the policy agenda – i.e. which policies will be promoted. They can act in a leadership role. Reforms to the Common Agriculture Policy have occurred at this level.

⇒ The Commission drafts law. This is the place where 20,000 civil servants create new policy. An example is the directive to reduce organic nitrogen loads, effectively reducing stocking rates throughout the EU to 2 cows per hectare. Lobby groups (e.g. the UK National Farmers Union) attempt to ensure the policy/law is crafted in a way that reflects their own interests. The Farmers Union have been quick to point out that organic nitrogen limits should be based on scientific evidence and need, a point the commission is taking no notice of.

⇒ The European Parliament reacts to proposals from the Council of Ministers, and has some powers (the powers vary according to the topic) to alter legislation. By now, a proposal is nearly law – the last chance for lobby groups to effect fine tuning or even the reversal of proposals.

⇒ National governments implement the law.

The result of all of this? The initial impression is that the concept of having a 'small government" to foster business success has never been heard of, that the thrill of writing new law beats the drudgery of enforcing old ones (the health and safety practices we observed amongst construction workers in Brussels were interesting to say the least), and that law by consensus is not necessarily good law. The latest reform of CAP has created incentives for conversion to organic farming of €30/Ha in the UK versus the subsidy of €200/Ha for a farmer in Germany.

One left Brussels thanking God that we don't have subsidies and the loss of control that a subsidy system results in, that we still consider business in implementing new policy and law (less so latterly perhaps), but also mindful of the flow-on impact that such new law will have on NZ producers via non-tariff trade barriers.

Their farming struggles, but Europe has world class food companies

In previous articles I have written about the inefficiency of Northern Hemisphere commodity farming. The Irish case is nearly different.

The margin that Irish dairy farmers are able to earn is impressive. The Irish milk price is currently equivalent to $7.80/kg milksolids, and cash costs are between $3 and $3.50/kg milksolids. Any dairy producer would dream of such a low cost to income ratio.

But this is not the whole story. On top of the cash costs there is depreciation ($1.00/kg MS) and wages of management ($1.00 - $2.00/kg MS). Still, the net margin appears to be better than anywhere else in Europe.

The barrier to more efficient farming comes down to a simple lack of scale – the average farm milks only 45 cows. The first problem in addressing this is industry culture; the second - the very real difficulties facing any farmer wanting to grow.

In terms of Irish culture, getting big appears to be frowned upon. Often neighbouring dairy farmers would rather lease or sell their farms to a distant cropping farmer than the neighbouring dairy farmer – almost 'if I didn't ultimately succeed then you won't either'.

The physical barriers to scale include the cost of land (more than $30,000/Ha), the size of blocks (10 – 20 Ha), the cost and availability of labour, and the availability of quota.

Quota is required to supply milk and costs about $10/kg milksolids. Farmers are happy to pay the money – the problem is availability. Rather than letting the market decide, the allocation system is weighted towards young and/or small farmers. A farmer with a relatively large quota of 20,000 kgMS might be allocated an extra 250 kgMS entitlement per year. Quota distribution is more about social policy than farming efficiency.

Whilst the farming is sub-standard, that doesn't limit Europe's ability to produce world class food companies.

Anyone would be impressed by Danone, a French company, and their absolute focus on cultured foods. They dominate world yoghurt markets and have backed this with their superb Danone Vitapole research facility dedicated to continual product innovation.

Nestlé is a multinational foods company with a component of dairy. They also focus on being number one in their market and have an impressive range of branded consumer products. Nestlé is focusing on nutrition and back up their brands with patents to obtain product exclusivity.

Arla is a Scandinavian co-operative who have grown to dominate their home markets and are now expanding in the United Kingdom (they distribute Anchor products on Fonterra's behalf).

In New Zealand we have often been told of the success of the Irish model of 'New Generation Co-operatives'. But strategy appears to have been far more important than structure; only one of the four companies that became publicly listed, Kerry Foods, can be considered a success over its 20 year history.

Whilst some will have heard the Kerry story, it is worth re-telling.

In the late 1970's Irish farmers responded to subsidies by producing a tidal wave of new milk; to cope Kerry embarked on ambitious capacity expansion. However, Brucellosis control measures found them in a vulnerable position with high debt and a falling milk supply. This occurred at a time when the Irish economy was struggling with high inflation, high interest rates and a lack of investment.

To the co-ops, the stock market appeared attractive as a source of equity to fund growth. Kerry Group PLC formed in 1984, followed by Waterford (1988), Golden Vale, and Avonmore (1989).

A series of unprofitable milk wars, poor investment decisions and high overheads resulted in Waterford and Avonmore merging, and Kerry taking over the struggling Golden Vale. Whilst the product of the Waterford and Avonmore merger, Glanbia, is finally emerging as a successful business, Kerry is by far the best achiever.

Kerry's turnover and profit figures have shown impressive growth (Figure 1). Today Kerry is more a food company than a dairy company. Key businesses include lifestyle and nutritional products (cheese snacks, processed meats, pre-packed sandwiches) ingredients (emulsifiers, proteins, Soya) and flavours and coatings.

What is impressive is that they achieve their success through such a diversified business – with 130 manufacturing facilities and providing 10,000 food and ingredient products. Business structure is via independent strategic business units, each with their own general management, production, sales, marketing and R&D team.

The result is a business dynamism that probably can't be matched by a more typically centralised command and control structure. A feature of Kerry's growth has also been their focus on new acquisitions to broaden and deepen their product offerings.

The downside to the Kerry story is that they are no longer dependent on milk. Whilst farmers appoint a majority of directors to the Board, this can't last indefinitely with Kerry Co-op owning only 31% of the shares in Kerry Group PLC (farmers individually own another 20%).

So the future for Irish dairy farmers might depend on how many Kerry shares they own. But if we in NZ can keep control of our cost structure and build our major co-ops into world class dairy-based food companies, we have a bright future indeed.

Figure 1. A decade of business growth for Kerry Group

	1994	**1997**	**2000**	**2003**
	$million			
Turnover	1120	1706	2621	3693
Operating profit	71	133	218	260
Profit	45	77	122	161

Everyday lowest prices

History shows that our payout is falling in real terms. McKinsey, a consulting firm, suggests underlying commodity prices are falling by 2% p.a. It's okay to draw conclusions from trend lines, but why is this happening? One reason seems to be the increasing dominance of supermarkets and the 'everyday lowest price' model.

Supermarkets in Europe are bigger, more sophisticated versions of what we have at home. Like in NZ, ownership has consolidated so that the top three in any country dominate - controlling 50-99% of market share. But they have gone further in their focus on reducing prices. They have used their dominant position to reduce purchasing costs, they have used their own-brands to speed up the commoditisation of food, and they have adopted rigorous category management disciplines.

The market leader in Britain, Tesco, is an interesting case. Ten years ago they were No. 2 in the market, and were aggressively chasing No.1. Their business focus was *'Better, Cheaper, Simpler'* – that is; increase quality, reduce costs and make it easier to bring new products and services to the market. Now they are the UK's largest supermarket, their most recent profit was $5 billion and they are seeing year-on-year growth of more than 15%.

Tesco has huge purchasing power. To achieve their price targets for 2005 they aim to negotiate with suppliers and brand owners to reduce the costs of products reaching the shelves by $210 million. Much of their own innovation addresses how to provide additional cost savings through reducing their internal distribution and staffing costs.

Tesco has led retail-brand development since the 1970's, today in excess of 50% of sales are now under the Tesco brand. For a particular product category they will stock the brand leader, say Kraft or Nestlé, perhaps the No. 2 brand, and their own-label brand. Unless a product has an iconic brand (and Anchor is still that) or unique attributes, they will deal direct with key suppliers to achieve a lower buying price of Tesco-branded products.

Farmers or processors that want to sell volume will often seek a contract to produce a supermarket own-label product. But it is a market where two or more suppliers will normally compete to provide the best product and service at the best price. And while a contract with Tesco gives some economies of scale, on one visit I attended, a Tesco manager outlined a change in packaging, distribution and labelling that, whilst they might help lift volumes, also increased the supplier's costs by 6 cents on a product that only sold for $1.50.

Whereas many supermarkets focus on the low-end commodity segment of the market, Tesco is also squeezing premium product lines by targeting 'Finer Food' customers. To do this Tesco has a *'Finest'* brand range which is distinctively packaged and targeted. Anyone wanting to impress the 'in-laws' could exclusively purchase the ingredients for any style of meal they wanted made up entirely from *'Finest'* products, including *Finest Marlborough Wine*.

Pressure on the price of food also comes from the supermarkets approach to category management. They measure profitability per unit of shelf space and analyse data

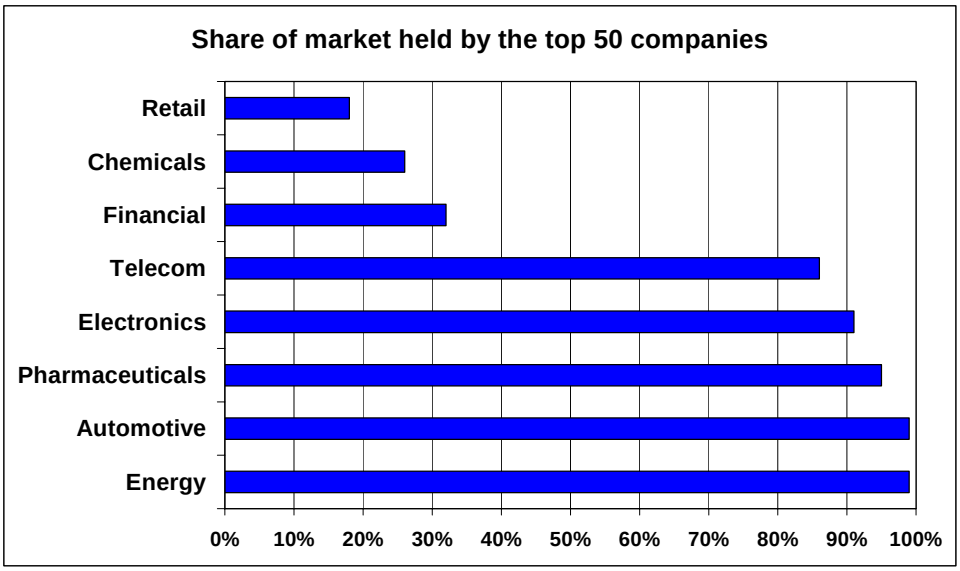
daily to determine which categories are profitable, and within those categories, which products and brands are performing. A supplier with an underperforming brand had better act by promoting the product ("buy two, get one free"), by increasing advertising or by launching a new product variant, or have it withdrawn to make room for someone else with a lower cost product or a new innovative feature.

At Wal-Mart, USA's and the world's biggest retailer, customers are greeted by the phrase "we sell for less – always". The suppliers of Wal-Mart branded products are expected to grow sales, reduce costs, develop new and innovative products, execute the basics of business process, and be willing to invest in the future. And if a supplier doesn't perform, or fulfil orders 100% of the time, 100% on-time, they can expect huge penalties and the loss of the business.

Traditionally, most of our dairy markets have had fragmented retailing sectors. As shown in figure 1, the top 50 retail companies only control 20% of the world retail market. Yet western retailers are looking overseas for growth – they are trying to blend knowledge of local culture with the sophistication of supply chain management, category management and retail-brand development. In the next 20 years we can expect a huge consolidation of global retailing – leading to more purchasing power and further downward reductions in food prices.

For us as NZ dairy farmers, the message is that the everyday lowest price model is here to stay – to prosper we will need to do what we have always done; improving performance, increasing quality, lifting efficiencies and benefiting from economies of scale. And it also emphasises the need for an efficient Fonterra network that can build matching competencies in world class protein ingredients and branded products that are sought after by customers for their taste, convenience and wellness benefits. Second best might not be good enough.

Figure 1. We can expect consolidation of the retailing sector in the next 20 years



Soya - threat or opportunity?

Picture a milk product that sells for a 15% premium over its competitors, claims health benefits, is cheap to source and manufacture and is experiencing 20% per annum volume growth. Is it a new innovative dairy product? No – Soy milk.

The humble Soya bean's composition is 40% protein, 18% fat and 24% carbohydrate. Soya protein competes as a low price substitute for milk proteins and processed Soya is an alternative 'white' beverage to milk.

Processed Soya has nutritional benefits, highlighted in Figure 1. Soya milk has traditionally been marketed to people with lactose intolerance and as being a healthy alternative to milk - it has low saturated fat levels and contains the very desirable Omega-3, a highly valued fatty acid related to cardiovascular health and brain function.

The influential US regulatory authority, the Food & Drug Administration (FDA) recently allowed Soya processors to promote Soya products as being able to 'lower blood cholesterol' and 'reduce the risk of coronary heart disease'.

The Soya industry seems to be a potential threat to the dairy industry – but is there an opportunity too?

As an industry we have accepted the benefits from sourcing and selling third party milk ingredients. Farmers have been told that by selling a partner's export product we can take a weak seller out of the market place, we can meet a wider range of customer needs and we can apply the commission earned to reduce the costs of our sales network.

It is a bigger stretch to suggest that Fonterra and others should take a strategic interest in the development of the Soya industry. But we would be wise to consider the possibility.

Soya is a commodity product subject to the same trends as other commodities; prices are tending to reduce as production shifts from mid-west America to Brazil and Argentina. Since 1990 Soya production has more than doubled in South America – exports from these two countries now make up more than half of internationally traded products. And with the breeding of new crop varieties that will prosper in Brazil's acidic soils, more than 100 million hectares of savannah is being converted to intensive agriculture. Currently South American production costs are 25% lower than for the USA – and with better transport infrastructure further cost reductions are probable.

The problem with this is that if the price of Soya protein continues to fall (and perhaps with trade reform at an accelerated rate), food manufacturers will reformulate their products away from dairy to Soya. If we ignore the trends and don't have a strategy to retain and build value, the effect will be a continual downward pull on dairy commodity prices.

The Soya Industry tends to be dominated by big merchant companies who are driving lower costs of production, building infrastructure and investing in the market to expand demand for Soya. Du Pont, Cargill and Monsanto have focused on refining cropping regimes and in breeding new and improved varieties. And with *Roundup Ready* Soya accepted throughout most of the world (Europe excepted), the future is for a whole range of genetically modified variants; some releases will focus on lowering the costs of production, others will feature improved nutritional attributes. Whereas these companies are strong competitors they are also, potentially, ready partners.

The taste and functional properties of Soya doesn't match dairy, but Soya manufacturing know-how is also improving. Soya can be used as an ingredient in processed cheese, ice creams, yoghurt and creams. And manufacturing processes are being refined and improved to ensure Soya products have a better flavour and improved functional properties. Some of the new developments in processing technology are well known to the NZ Dairy Industry – particularly around protein fractionation and ingredient recombination. Is there an opportunity to spread our ownership of some of the technology platforms we use in dairy, but apply them to Soya?

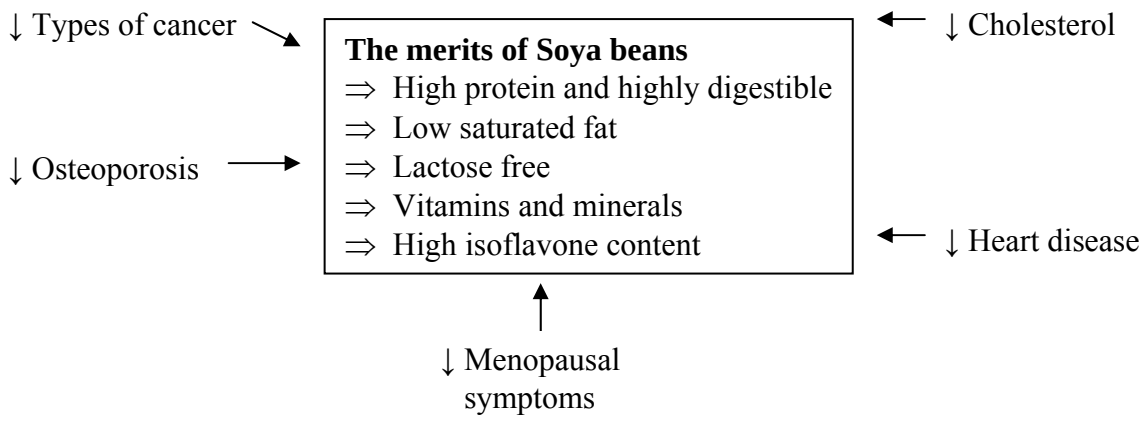
As suggested in the introductory paragraph of this article, Soya milk itself is a competitive threat. In the beverage market, Tetra Pak is making a play by providing ready-built processing plants making Soya milk. If a litre of packaged cows-milk costs the equivalent of 100 cents, it is claimed that Soya milk can be produced through a Tetra Pak plant for 60 cents. With new aseptic (germ free) packaging, soy milk can be sold without the need for refrigeration or preservatives.

With this increased processing capability one development is the emergence of Soya/Dairy milk blends. The dairy industry largely missed out on developing the vegetable oil and butter blends that now have a major market share in the spreads market. Are we to miss out again?

Finally, the marketers of Soya products appear to have taken more freedom in formulating and packaging products; products feature patented formula's, are fortified with vitamins and minerals and have a range of flavours, attractive packaging options and upbeat marketing images. Can we learn from these, at this stage, small players?

So if Soya is doing so well, do we treat it as a threat, focusing on improving the value-added functionality of dairy, or can we, at least on the fringes, profit from the Soya opportunity?

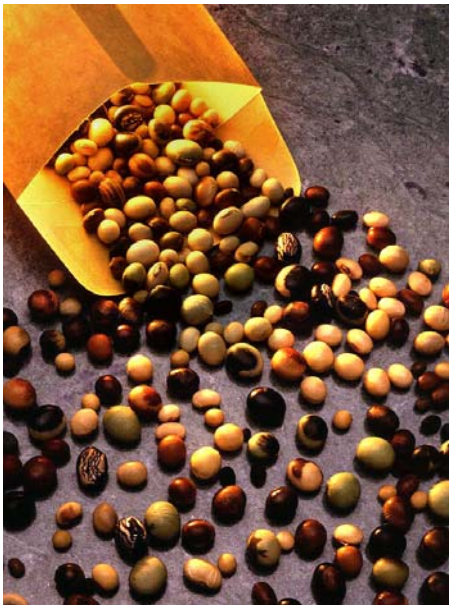
Figure 1. The attributes of Soya



Or use this one…

Table 1. The merits and attributes of Soya

The merits of the Soybean	Health benefits
High protein and highly digestible	Reduces cholesterol
Low saturated fat	Reduces risk of heart disease
High Omega-3 fatty acids	Reduces risk of osteoporosis
Lactose free	Reduces risk of cancer
Good source of vitamins and minerals	Aids in reducing menopausal symptoms
High isoflavone content	



The humble Soya bean

Soya milk is marketed as an attractive single-serve beverage