About Coriolis’ services

Coriolis is a boutique management consulting firm that focuses on food, consumer packaged goods, retailing and foodservice.

Coriolis advises clients on strategy, operations, organization, and mergers and acquisitions. We develop practical, fact-based insights grounded in the real world that guide our clients’ decisions and actions. Founded in 1999, Coriolis is based in Auckland, New Zealand and works on projects across the Asia Pacific region.

WHAT WE DO
We help our clients assemble the facts needed to guide their big decisions. We make practical recommendations. Where appropriate, we work with them to make change happen.

HOW WE DO IT
Our style is practical and down-to-earth. We try to put ourselves in our clients’ shoes and focus on actions. We listen hard, but we are suspicious of the consensus. We provide an external, objective perspective. We are happy to link our fees to results.

WHO WE WORK WITH
We only work with a select group of clients we trust. We build long term relationships with our clients and more than 80% of our work comes from existing clients. Our clients trust our experience, advice and integrity.

Typical assignments for clients include...

FIRM STRATEGY & OPERATIONS: We help clients develop their own strategy for growing sales and profits. We have a strong bias towards growth driven by new products, new channels and new markets.

MARKET ENTRY: We help clients identify which countries are the most attractive - from a consumer, a competition and a channel point-of-view. Following this we assist in developing a plan for market entry and growth.

VALUE CREATION: We help clients create value through revenue growth and cost reduction.

TARGET IDENTIFICATION: We help clients identify high potential acquisition targets by profiling industries, screening companies and devising a plan to approach targets.

DUE DILIGENCE: We help organisations make better decisions by performing consumer and market-focused due diligence and assessing performance improvement opportunities.

EXPERT WITNESS: We provide expert witness support to clients in legal cases and insurance claims. We assist with applications under competition/fair trade laws and regulations.
This research was commissioned by the New Zealand Board of the Pacific Economic Cooperation Council (NZPECC). The research is designed to improve understanding of Global Value Chains (GVCs) which are an important feature of how business organises itself globally.

**How do you define a global value chain?**

For this research, GVC is taken to mean the chain of market interactions along which returns from the final consumer of a product are divided among all participants that have contributed to that final product. Different terms are used. “Supply chain” can be taken to emphasise the physical logistic systems involved in international commerce; “value chain” is more common in business contexts but can be confused with rhetoric about “added value” and reasonable questions about what is “value” and what is “cost”; Asian discussions are increasingly using “international production networks” which has the virtue of not privileging any part of an international production system.

**Why is the research being conducted?**

Improved understanding of GVCs is potentially crucial for New Zealand’s attempts to lift exports’ share of GDP. A better understanding of where and how our exports are used as ‘inputs’ to the production and exports of other countries, whether simply as food or more directly as inputs that form part of other final products, and the options for maximising return to the New Zealand economy, can inform policy to grow New Zealand exports. On top of this a more in-depth understanding and focus on GVCs has the potential to re-frame the trade policy debate - away from: imports are bad, exports are good; to recognition by our trading partners that competitively priced imports are essential for a country to be a successful participant in the modern global economy. NZPECC needs to get a better appreciation of the possible trade policy implications of these trends and developments.

Against this background, NZPECC has commissioned this research, which is designed to focus on commercial realities and implications for companies and government policies.

**What is the structure and scope of the research?**

Specifically the research must address the following four broad questions:

(A) Detailed and comprehensive description and analysis of the value chain in some representative key NZ exports, particularly in the Asia-Pacific. In relation to dairy, the research would focus on:

- A representative basic commodity powder namely Milk Powder in the Asia Pacific region.
- Considering the same product through two different value chains: i.e. as a commodity product that feeds into further manufacturing in another country and the same product that undergoes further manufacturing in New Zealand to the stage where it is delivered and ready to consume in another market. The two commodities to be analysed are:
  - UHT milk
  - Infant formula

Analysis will include the mapping of respective GVC’s, calculation of representative costs through identification then sourcing of all relevant and material individual components e.g. capital investments, materials sourcing, financing, supply chain and if appropriate brand development costs.

(B) Analysis of factors that motivate the choice of position in respective GVC’s of the representative products identified above and why that is judged to be optimal.

(C.1) Drawing on the results of the preceding analysis, and building on existing research, identify the barriers for NZ firms/industries to move to grow their value or capture a bigger share of the total available value; highlight how firms have become engaged in GVCs; and

(C.2) Drawing on all the foregoing, and to the extent possible, identify the main implications for future government policy, especially in the areas of services and regulatory reform; how a coordinated ‘think value chain’ approach might be pursued across policy issues under negotiation; and where business could appropriately be involved to help identify policy constraints and provide critical data.

**About NZPECC**

The Pacific Economic Cooperation Council (PECC) is a non-governmental body, serving as a regional forum for cooperation and policy coordination in the Asia Pacific to promote regional economic growth and development. The New Zealand Committee of the Pacific Economic Cooperation Council is a founding and active member of the PECC community. It works to gain strong business and institutional links into the Asia Pacific market and to tie public policy theory and research into practical business outcomes for New Zealand.

PECC was formed in 1980 and now has 26 Member Committees. Each Member Committee brings together leading thinkers, and decision makers from government, academia and business in an informal setting to discuss and formulate ideas on the most significant challenges facing the Asia Pacific.
While this document acts as a stand-alone analysis of the global infant formula value chain relevant to New Zealand, it is part of a wider NZPECC project; the first section of this research looks at the strategic situation facing the New Zealand infant formula industry.

### I. Infant formula global value chain research

### II. UHT milk global value chain research

### III. Insights for policy makers

#### A. Strategic situation facing the New Zealand infant formula industry

- What is the big picture?
- What is the global situation?
- Where are New Zealand firms currently positioned?
- Why are New Zealand firms positioned where they are?
- What barriers do New Zealand firms face in infant formula specifically?

#### B. Detailed and comprehensive representative global value chain for infant formula

- Develop a detailed and representative value chain for New Zealand milk powder from the farm through to retail sale of infant formula to the consumer
  - Non-New Zealand production
  - New Zealand production
- Mapping, modelling and costing

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*Client brief section B and parts of C1*

*Client brief section A*
KEY FINDINGS & CONCLUSIONS - GLOBAL

Infant formula is a tough industry, with strong barriers to entry, undergoing consolidation; China is the main exception, but signs there point to a rapidly normalising playing field

Infant formula is one of the most complex foods in existence. It is an engineered food designed to mimic human breast milk as closely as possible. Infant formula sits on the dividing line between food and pharmaceuticals. This is indicated by the fact that the industry has historically been dominated by major pharmaceuticals firms (Abbott, Wyeth, BristolMyersSquibb, GlaxoSmithKlein, Numico).

From a business point-of-view infant formula is a highly attractive activity, as it is a highly defensible category. This defensibility derives from (1) product complexity, (2) economies of scale, (3) patents and other intellectual property, (4) the importance of doctors in the sales process, (5) global regulations (e.g. bans on advertising) and (6) widespread government market intervention (e.g. two-thirds of all infant formula in the United States is purchased by the United States Department of Agriculture’s Special Supplemental Nutrition Program for Women, Infants and Children (WIC)).

This defensibility has let to a highly consolidated global market dominated by a handful of multinational companies. Consolidation is even more pronounced at the national or regional level with almost all markets structured as three or four key firms, typically some subset of the global firms and, perhaps some vestigial regional brands, and a few small niche brands (e.g. organic, goat).

The industry is currently undergoing terminal consolidation with the multinational companies merging also including the remaining small regional players until stopped by competition authorities. Recent major deals include Nestle buying Pfizer’s infant nutrition unit for US$11.9b in 2012 (Pfizer having itself bought Wyeth) and Danone buying Numico/Nutricia for €12.3b in 2007 (Numico itself being the result of a decade plus industry roll-up). To put these number in perspective, Fonterra has a current market capitalisation of US$8.7b.

The main exception to this ongoing consolidation is China, which is similar to developed markets 100 years ago. In China a wide range of players competing, including all the major global multinationals, the major local dairy firms (Mengniu, Yili, others), regional start-ups (BeingMate, Biostime, others) and a huge range of smaller firms. Much, if not all, of the current action and excitement in the New Zealand infant formula industry can be seen as a result of this situation in China.

However the Chinese government appears to be “taking steps” to bring order to the market:

“According to local reports, the Ministry of Industry and Information Technology (MIIT) has indicated that it hopes to reduce the number of manufacturers to 3-5 firms with revenues exceeding CNY50bn (US$8b) by 2018.” Just-Food, August 16, 2013

The industry dynamic is also changing. As product innovation has slowed and as production technology has diffused more widely, the industry is becoming more similar to other foods and barriers to entry are falling. The future looks set to be a battle between the multinationals leaders and the primarily Chinese newcomers for control of Asia.
New Zealand has a long history of integration into global infant nutrition value chains. Historically (and still in volume terms) New Zealand has primarily been a supplier of dairy ingredients to the industry rather than a producer of finished product. New Zealand is the largest exporter of low/no fat milk powder in the world (and has been among the top five exporters for the past 50 years). All major infant nutrition firms in the world buy raw materials from New Zealand. In the 1950’s, when Wyeth and Mead Johnson built infant nutrition plants in the Philippines, the New Zealand Dairy Board was a trusted supplier. As a more recent example of the importance of New Zealand to the global infant formula value chains, Abbott disclosed that its plant in Guangzhou, China uses 100% NZ milk.

While the Glaxo (“The food that builds bonnie babies”) part of GlaxoSmithKlein was founded in Bunnythorpe, New Zealand in 1904 to make infant milk products, the firm exited domestic production in the mid 20th century. Up until 2003 New Zealand produced a small amount of infant formula domestically, had minimal infant formula exports and export growth was low. Global #2 Nutricia (now Danone) acquired and operated locally founded Karicare, but the industry was decidedly sleepy.

The situation changed in around 2003 when Fonterra invested in improved/upgraded wet processing and contract packing operations.

Over the next decade the New Zealand infant formula industry experienced rapid growth. Fonterra has moved strongly up the value chain from ingredient milk powder into (1) bulk base infant formula powder, (2) contract packing retail product for others (e.g. Nestle) and (3) is now moving into retail of Fonterra-branded products.

The success of Fonterra encouraged other New Zealand dairy firms to move into infant nutrition. Westland, Synlait, Sutton Group and New Image now also manufacture bulk infant formula powder.

More recently three of the four largest dairy companies in China - Yili (greenfields), Mengniu (greenfields), and Bright (Synlait) - have invested in infant formula plants in New Zealand.

The availability of bulk infant formula in wholesale quantities in New Zealand from Fonterra, etc. has let to the rapid emergence of a canning industry populated with a nimble and efficient group of contract packers. This in turn – in combination with the “Wild West” conditions in the Chinese market - has led to the emergence of a huge number (100+) of smaller “pure play” firms selling and marketing infant formula from New Zealand.

At the same time, the Dairy Goat co-operative has quietly been pursuing a successful niche strategy building on the unique properties of goat infant formula.

The New Zealand infant nutrition industry is an interesting microcosm and one of the best examples of the country’s ongoing move up the value chain. There has been significant investment in the industry over the past decade - in the order of $900m to $1b - and exports continue to grow. While the future is full of opportunities, there are clouds on the horizon, particularly in China.
STRATEGIC SITUATION
The current strategic situation in the New Zealand infant formula industry is driven by both the global situation and NZ firms strategic directions; this sections explores these

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GLOBAL SITUATION

Highly defensible category

Dominated globally by a handful of multinationals and some vestigial regional brands

In terminal consolidation (multinationals rolling up remaining small regional players until stopped by competition authorities)

Except in China which is similar to developed markets 100 years ago where a wide range of players are competing

- Global category leaders (Nestle, Danone, Abbott & Mead Johnson)
- Local dairy firms (Mengniu, Yili, others)
- Regional start-ups
- Local small firms (Rats & mice)

However the Chinese government appears to be “taking steps” to bring law and order to the market

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NZ FIRMS STRATEGIC DIRECTIONS

Co-ops moving up the value chain from ingredient milk powder into base infant formula powder

Fonterra moving into contract packing finished product for multinational companies

Fonterra planning to move into selling branded infant formula in Asia

Three large Chinese dairy firms investing in integrated wet/dry IF plants in New Zealand

Dairy Goat co-op pursuing a successful niche strategy

A few better financed start-ups dry blending or wet/dry blending (e.g. Sutton, New Image, GMP)

Huge number of smaller “pure play” sales and marketing only firms (100+)
WHAT IS INFANT FORMULA?

Infant formula is made from a mixture of dairy and other ingredients and is designed to mimic human breast milk as closely as possible; while made to a common international codex, formulations & ingredients do vary.

EXAMPLES: Ingredients in Abbott Similac and Nestle NAN HA Gold 2 infant formula

Water, Nonfat Milk, Lactose, High Oleic Safflower Oil, Soy Oil, Coconut Oil, Galactooligosaccharides, Whey Protein Concentrate.

Less than 2% of the Following: (43 listed ingredients)

C. Cohnii Oil, M. Alpina Oil, Beta-Carotene, Lutein, Lycopene, Ascorbic Acid, Soy Lecithin, Monoglycerides, Potassium Citrate, Calcium Carbonate, Potassium Chloride, Carageenan, Ferrous Sulfate, Magnesium Chloride, Choline Chloride, Choline Bitartrate, Taurine, m-Inositol, Calcium Phosphate, Zinc Sulfate, Potassium Phosphate, d-Alpha-Tocopheryl Acetate, Niacinamide, Calcium Pantothenate, L-Carnitine, Vitamin A Palmitate, Cupric Sulfate, Thiamine Chloride Hydrochloride, Riboflavin, Pyridoxine Hydrochloride, Folic Acid, Manganese Sulfate, Phylloquinone, Biotin, Sodium Selenate, Vitamin D3, Cyanocobalamnin, Salt, Potassium Hydroxide, and Nucleotides (Adenosine 5'-Monophosphate, Cytidine 5'-Monophosphate, Disodium Guanosine 5'-Monophosphate, Disodium Uridine 5'-Monophosphate).

Enzymatically hydrolysed whey protein (milk), maltodextrin, vegetable oils,

minerals (calcium phosphate, magnesiuim chloride, calcium chloride, potassium chloride, sodium chloride, ferrous sulphate, zinc sulphate, copper sulphate, calcium carbonate, manganese sulphate, potassium iodide, sodium selenate), omega LCPUFAs (DHA from fish oil, AA), acidity regulator (citric acid), L-phenylalanine, vitamins [sodium ascorbate (vit C), d-l alpha tocopheryl acetate (vit E), retinyl acetate (vit A), niacinamide (niacin), phylloquinone (vit K), cholecalciferol (vit D3), calcium pantothenate, thiamine mononitrate (vit B1), pyridoxine hydrochloride (vit B6), riboflavin (vit B2), folic acid, cyanocobalamnin (vit B12), biotin], L-histidine, nucleotides (cytidine 5'-monophosphate, uridine 5'-monophosphate, adenosine 5'-monophosphate, guanosine 5 monophosphate), culture (bifidus, thermophilus), L-carnitine, antioxidant (ascorbyl palmitate).
## HOW IS IT SEGMENTED?

Infant formula is typically defined as “birth to six months”; the product is then renamed for a range of reasons (primarily to avoid regulation and restrictions on advertising)

### Five stage segmentation of infant/child nutrition products

*Model: 2013*

<table>
<thead>
<tr>
<th>Stage 1/Step 1</th>
<th>Stage 2/Step 2</th>
<th>Stage 3/Step 3</th>
<th>Stage 4/Step 4</th>
<th>Stage 5/Step 5</th>
<th>Pregnant mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common name</strong></td>
<td><strong>Infant formula</strong></td>
<td><strong>Infant formula</strong></td>
<td><strong>Children’s nutrition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Follow on formula</td>
<td>Follow up formula</td>
<td>Toddler formula</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>“Growing up milk”</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Regulatory</strong></td>
<td><strong>Highly regulated</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Regulated as dairy</strong></td>
</tr>
<tr>
<td>environment</td>
<td>Advertising banned</td>
<td></td>
<td></td>
<td></td>
<td>Advertising allowed</td>
</tr>
<tr>
<td></td>
<td>(by law or voluntarily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manufacturers focus on selling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>through doctors &amp; nurses</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Defined target age range</strong></td>
<td><strong>Birth to 6mo.</strong></td>
<td><strong>6mo. to 1 year</strong></td>
<td><strong>1 to 3 years</strong></td>
<td><strong>3 to 6 years</strong></td>
<td><strong>6 years +</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pregnant &amp; lactating women</td>
</tr>
<tr>
<td><strong>EXAMPLE range:</strong></td>
<td><img src="#" alt="Image 1" /></td>
<td><img src="#" alt="Image 2" /></td>
<td><img src="#" alt="Image 3" /></td>
<td><img src="#" alt="Image 4" /></td>
<td><img src="#" alt="Image 5" /></td>
</tr>
</tbody>
</table>

Source: photo credit (fair use; low resolution; complete product/brand for illustrative purposes); Coriolis from a range of published sources
HOW IS THE MARKET STRUCTURED?

Infant formula is one of the most consolidated food products globally; the top five firms account for 56% of the world market; however there are an emerging group of Chinese firms challenging the world order.

Baby food/infant nutrition global market share by firm (US$m; 2013)

- Nestlé 23%
- Danone 13%
- Mead Johnson 10%
- Abbott 6%
- Heinz 3%
- Friesland 2%
- Hipp 2%
- Hero 1%
- Daqing 1%
- Yashili 2%
- Biostime 2%
- Morinaga 1%
- Hain Celestial 1%
- Meiji 1%
- Wonder Sun 1%
- Yili 1%
- Daqing 1%
- Yashili 2%
- Biostime 2%
- Beingmate 3%
- Meiji 1%
- Morinaga 1%
- Hain Celestial 1%
- Hero 1%
- Daqing 1%
- Yashili 2%
- Biostime 2%
- Beingmate 3%

Other 28%

Data here is infant formula and baby food; IF is ~70% of global baby food category value.

Source: Euromonitor; Coriolis analysis
IS THERE A TYPICAL MARKET STRUCTURE?
Markets are typically structured as three or four key firms and a small other.

Baby food/infant formula market share by select market
% of sales; 2013

Source: Euromonitor; Coriolis analysis
China is the main exception and the infant formula market there is still highly fragmented; much of the current action and excitement in the New Zealand infant formula industry can be seen as a result of this situation.

**Baby food/infant nutrition market share by firm in China**

(US$m; 2013)

- Nestlé 12%
- Mead Johnson 10%
- Danone 10%
- Abbott 4%
- Heinz 3%
- Friesland 1%
- Beingmate 9%
- Biostime 6%
- Mengniu 6%
- Daqing 5%
- Wonder Sun 3%
- Yili 4%
- Mengniu is building an IF plant in New Zealand
- Bright Food 0%
- Wei Chuan 0%
- Synutra 1%
- Hunan Yahua 1%
- Ausnutria 1%
- Yaolan 1%
- Wissun 1%
- Yili is building an IF plant in New Zealand
- Bright is a shareholder in Synlait
- Only NZ firm registers in the data; Healtheries has more share than Fonterra
- Friesland is a shareholder in Synlait
- Abbott said all the milk for its Chinese IF plant comes from NZ
- Abbott said all the milk for its Chinese IF plant comes from NZ

"According to local reports, the Ministry of Industry and Information Technology (MIIT) has indicated that it hopes to reduce the number of manufacturers to 3-5 firms with revenues exceeding CNY50bn by 2018." Just-Food, August 16, 2013

Source: Euromonitor; Coriolis analysis
WHERE IS GROWTH COMING FROM?

Industry growth is almost non-existent (after inflation) in the developed world; China is driving world growth, growing +50% more than the rest of the world combined; however strong growth across the developing world.

Growth in baby food/infant nutrition sales by global region
(US$b; 2004-2009)

<table>
<thead>
<tr>
<th>Region</th>
<th>Absolute Change (08-13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>+$10.8</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>+$1.5</td>
</tr>
<tr>
<td>Indonesia</td>
<td>+$1.3</td>
</tr>
<tr>
<td>Vietnam</td>
<td>+$0.5</td>
</tr>
<tr>
<td>Thailand</td>
<td>+$0.3</td>
</tr>
<tr>
<td>Philippines</td>
<td>+$0.4</td>
</tr>
<tr>
<td>Other E/SE Asia</td>
<td>+$0.7</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>+$1.5</td>
</tr>
<tr>
<td>Latin America</td>
<td>+$1.7</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>+$2.0</td>
</tr>
<tr>
<td>Australasia</td>
<td>+$0.4</td>
</tr>
<tr>
<td>Western Europe</td>
<td>-$0.7</td>
</tr>
<tr>
<td>North America</td>
<td>+$0.2</td>
</tr>
<tr>
<td>Everywhere Else</td>
<td>+$8.3</td>
</tr>
<tr>
<td>China+HK</td>
<td>+$12.3</td>
</tr>
</tbody>
</table>

Source: Euromonitor; Coriolis analysis
There has been significant investment – in the order of $900m to $1b – in the New Zealand infant formula industry over the past decade

Identified investments in Infant Formula production plant and capacity in New Zealand

<table>
<thead>
<tr>
<th>Date</th>
<th>Firm</th>
<th>Plant location</th>
<th>Investment</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>Dairy Goat Co-op</td>
<td>Hamilton</td>
<td>$16m</td>
<td>Spray drying plant built at Gallagher Drive, Hamilton site</td>
</tr>
<tr>
<td>2006</td>
<td>Dairy Goat Co-op</td>
<td>Hamilton</td>
<td>N/A</td>
<td>Dry Blending plant built at Gallagher Drive site</td>
</tr>
<tr>
<td>2007</td>
<td>Fonterra</td>
<td>Waitoa Darnum (AU)</td>
<td>$72m</td>
<td>Investing $71.8 million in +33% increase nutritional milk-powder production, which is mainly devoted to baby and toddler formulas (from 90,000 to 120,000 tonnes), Fonterra “seeing “double-digit growth” in nutritional powders in Asia due to strong birth rates, and was signing global supply agreements with up to five major international marketers”</td>
</tr>
<tr>
<td>2011</td>
<td>Westland</td>
<td>Hokitika</td>
<td>N/A</td>
<td>Infant formula (base formula), follow-on formula and growing-up milk</td>
</tr>
<tr>
<td>2011</td>
<td>New Image Group</td>
<td>Paerata, South Auckland</td>
<td>N/A</td>
<td>Spray dryer designed for the powder production of specialised colostrum and milk materials for use in nutritional formulations; New Image operates four sites across Auckland encompassing the entire production chain</td>
</tr>
<tr>
<td>2011</td>
<td>Synlait (Bright/Mitsui)</td>
<td>Dunsandel, Canterbury</td>
<td>$100m</td>
<td>Infant formula plant</td>
</tr>
<tr>
<td>2012+</td>
<td>Gardians (Sutton Group + Paterson Corp.)</td>
<td>Balclutha, Otago</td>
<td>N/A</td>
<td>Infant formula plant</td>
</tr>
<tr>
<td>2013</td>
<td>Westland</td>
<td>Rolleston, Canterbury</td>
<td>N/A</td>
<td>Various nutritional milk based products (e.g. infant formula, growing up milk powders etc.)</td>
</tr>
<tr>
<td>2013</td>
<td>Dairy Goat Co-op</td>
<td>Hamilton</td>
<td>$67m</td>
<td>Second powder dryer; four times the capacity of existing plant</td>
</tr>
<tr>
<td>2014+</td>
<td>Mengniu/Yashili</td>
<td>Pokeno, Waikato</td>
<td>$212m</td>
<td>Infant formula plant</td>
</tr>
<tr>
<td>2014+</td>
<td>Inner Mongolia Yili</td>
<td>Glenavy, South Canterbury</td>
<td>$214m</td>
<td>Infant formula plant at acquired Oceania Dairy site (47,000t at full capacity)</td>
</tr>
</tbody>
</table>

Source: various published articles & press releases
EXAMPLE: Simplified model of six possible strategic positions for firms in the infant formula industry

Model: 2013

SEGMENTATION

We propose the following six potential strategic positions for firms in the infant formula industry.

1. Multinational leader
2. Regional player
3. Bulk formula production
4. Niche products
5. Contract Canner/Packer
6. Pure Sales & Marketing

**Volume of product sold** (implies scale)

**Average mark-up per unit** (implies profit per unit)

Source: Coriolis
**WHY?**

A firm’s strategic position is a function of the factors available to leverage; all positions are obviously not available to all firms

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</tr>
</thead>
<tbody>
<tr>
<td>Did you invent infant formula?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Have you been doing R&amp;D leading to NPD for 100 years?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Are you a global leader in the category?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Do you own global brands?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Do you spend a lot of money marketing to consumers globally?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Do you have a large salesforce regularly visiting all channels?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Do you have lots of money? Can you get more?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Are you really good at spray drying? Do you have scale?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Are you located close to low cost milk?</td>
<td>⬜/⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Is the countryside around your factory picturesque?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Do you have enthusiasm and entrepreneurial vigour?</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

**Source:** Coriolis
EXAMPLE: Simplified model of six possible strategic positions for actors in the infant formula industry

Model: 2013

Firms in all identified strategic positions can be identified in New Zealand

1. Other examples of a niche position, though not in NZ, is organic (e.g. Bellamy’s Organic baby food in Tasmania); Source: Coriolis
## 1. MULTINATIONAL LEADERS

Two of the global top six infant formula manufacturers now own infant formula factories in New Zealand, two others have product contract packed in the country; Mead, Abbott, Morinaga and Meiji all buy from NZ

### Top 11 global baby food/infant formula multinationals and their identified activities in New Zealand (if any)

**As of August 2013**

<table>
<thead>
<tr>
<th>Firm</th>
<th>Global revenue</th>
<th>Global Employees</th>
<th>Ownership</th>
<th>Do they source raw dairy ingredients from New Zealand?</th>
<th>New Zealand infant formula activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nestle</td>
<td>CHF92.2b</td>
<td>339,000</td>
<td>Publicly listed Switzerland</td>
<td>- Yes, lots</td>
<td>- Contract packed by Fonterra</td>
</tr>
<tr>
<td>Danone</td>
<td>€19.3b</td>
<td>101,000</td>
<td>Publicly listed France</td>
<td>- Yes, lots</td>
<td>- Factory in New Zealand</td>
</tr>
<tr>
<td>Mead Johnson</td>
<td>US$3.9b</td>
<td>5,600</td>
<td>Publicly listed USA</td>
<td>- Yes, lots</td>
<td>- No factory; likely buys base powder</td>
</tr>
<tr>
<td>Abbott</td>
<td>US$38.9b</td>
<td>70,000</td>
<td>Publicly listed USA</td>
<td>- Yes, lots</td>
<td>- No factory; likely buys base powder</td>
</tr>
<tr>
<td>Heinz</td>
<td>US$11.6b</td>
<td>32,200</td>
<td>Private equity USA</td>
<td>- Yes, lots</td>
<td>- Contract packed by Fonterra</td>
</tr>
<tr>
<td>Freisland Campina</td>
<td>€10.3b</td>
<td>22,000</td>
<td>Co-operative Netherlands</td>
<td>- Not much</td>
<td>- Acquired 7.5% share in Synlait Aug 2013</td>
</tr>
<tr>
<td>Hipp</td>
<td>€1.1b</td>
<td>1,200</td>
<td>Private Germany</td>
<td>- Primarily baby food not IF</td>
<td>-</td>
</tr>
<tr>
<td>Hero</td>
<td>CHF1.5b</td>
<td>4,000+</td>
<td>Private Switzerland</td>
<td>- Not much</td>
<td>-</td>
</tr>
<tr>
<td>Hain</td>
<td>US$1.7b</td>
<td>3,670</td>
<td>Publicly listed USA</td>
<td>- Primarily organic IF in the US; no NZ market access</td>
<td>-</td>
</tr>
<tr>
<td>Morinaga</td>
<td>¥594.2b</td>
<td>5,710</td>
<td>Publicly listed Japan</td>
<td>- Yes</td>
<td>- No factory; likely buys base powder</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Potential to build a plant in NZ ??</td>
</tr>
<tr>
<td>Meiji</td>
<td>¥1,109.2b</td>
<td>15,338</td>
<td>Publicly listed Japan</td>
<td>- Yes</td>
<td>- No factory; likely buys base powder</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Potential to build a plant in NZ ??</td>
</tr>
</tbody>
</table>

Source: Coriolis from a wide range of sources
1. MULTINATIONAL LEADERS

New Zealand has a high comparative advantage in dairy but is embedded in a relatively small regional market.

Relative comparative advantage vs. size of regional market in dairy products
*Model: 2013*

### Multinational leader

- **High Comparative advantage in key raw materials**
  - New Zealand
  - Argentina
  - Canada
  - United States
  - Europe
  - China

### Size of regional consumer expenditure on product
- **Large**
  - Singapore
  - Japan
  - Barbados
  - Tonga

- **Small**
  - Uruguay
  - Australia
  - Kenya

Source: Coriolis
1. MULTINATIONAL LEADERS

Historically multinational manufacturers built plants in regions of large “home” markets with comparative advantage in dairy; more recently they have built plants in large markets with low comparative advantage.

**Relative comparative advantage vs. size of regional market in dairy products**

*Model: 2013*

---

**HISTORICAL**
- United States
- Canada
- Argentina
- New Zealand

**RECENT**
- China
- Singapore
- Japan
- Cuba
- Barbados
- Tonga

---

**Comparative advantage in key raw materials**

- High
- Low

---

**Size of regional consumer expenditure on product**

- Large
- Small

---

*Source: Coriolis*
### EXAMPLE: Location of infant formula/baby nutrition plants of Mead Johnson and Abbott Nutrition

**As of August 2013**

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Mead Johnson</th>
<th>Abbott</th>
<th>Reason for Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910's</td>
<td>Evansville, IN, United States</td>
<td>Columbus, OH, United States</td>
<td>Near raw materials, Near consumers</td>
</tr>
<tr>
<td>1920’s-1940’s</td>
<td>Zeeland, MI, United States</td>
<td>Sturgis, MI, United States</td>
<td>Near raw materials, Near consumers</td>
</tr>
<tr>
<td>1950’s</td>
<td>Mexico City, Mexico</td>
<td>Zwolle, Netherlands</td>
<td>Near raw materials, Near consumers</td>
</tr>
<tr>
<td>1960’s</td>
<td>Manila, Philippines</td>
<td>Cootehill, Ireland</td>
<td>Near raw materials, Competitive manufacturing</td>
</tr>
<tr>
<td>1970’s</td>
<td>-</td>
<td>Casa Grande, AZ, United States</td>
<td>-</td>
</tr>
<tr>
<td>1980’s</td>
<td>Nijmegen, Netherlands</td>
<td>-</td>
<td>Near raw materials, Near consumers</td>
</tr>
<tr>
<td>1990’s</td>
<td>Guangzhou, China, Chonburi, Thailand</td>
<td>-</td>
<td>Near consumers</td>
</tr>
<tr>
<td>2000’s</td>
<td>Singapore, SE Asia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2010’s</td>
<td>-</td>
<td>Jiaxing, China, Argentina</td>
<td>Near consumers</td>
</tr>
</tbody>
</table>

**Reason for Location**
- Near raw materials
- Near consumers
- Competitive manufacturing
- Inside EU
- - Near consumers

---

1. Acquisition; Source: Coriolis from various published articles and reports
1. MULTINATIONAL LEADERS

When multinational leaders build infant formula plants in markets accessible to New Zealand dairy product, New Zealand firms’ sales to those market then grow

EXAMPLE: Import volume of milk powder into the Philippines by source country
Kg; millions; 1962-2012

1. Obviously for a range of uses not just infant formula; Source: UN Comtrade database (custom job); Coriolis analysis and classification

Both Wyeth (now part of Nestle) and Mead Johnson build infant nutrition plants in the Philippines in the mid-60’s; following this, the country’s imports of milk powder, from New Zealand and elsewhere, increased.
## 2. REGIONAL DAIRY

Three of the top four largest dairy companies in China have or are building infant formula production plants in New Zealand; however the main Chinese pure-play IF manufacturers appear to be investing in Europe

### Details of Chinese dairy firms activities in New Zealand

*As of August 2013*

<table>
<thead>
<tr>
<th>Firm</th>
<th>Position in Chinese dairy market</th>
<th>Global revenue</th>
<th>Ownership</th>
<th>New Zealand (and other) investments</th>
<th>Websites</th>
</tr>
</thead>
<tbody>
<tr>
<td>伊利</td>
<td>#1 milk producer in China by sales and volume</td>
<td>CHY 43.5b US$7.0b 57,800</td>
<td>Publicly listed</td>
<td>- Granted approval to build Infant Formula plant in New Zealand</td>
<td><a href="http://www.yili.com/">http://www.yili.com/</a></td>
</tr>
<tr>
<td>蒙牛</td>
<td>#2 milk producer in China by sales and volume</td>
<td>CHY 36.16b US$5.9b 30,000</td>
<td>COFCO 19% + others (COFCO revenue US$28.2b)</td>
<td>- Recently acquired infant formula maker Yashili for HK$12.5b (NZ$2b) - Yashili planning to open infant formula plant in New Zealand (in Pokeno) - JV with Arla (Denmark/Sweden) for yoghurt venture - JV with Danone (France) and COFCO for yoghurt venture</td>
<td><a href="http://www.mengniuir.com">http://www.mengniuir.com</a> <a href="http://www.yashili.hk">http://www.yashili.hk</a></td>
</tr>
<tr>
<td>#4 milk producer in China by sales and volume</td>
<td>Group US$7b (11)</td>
<td>State owned parent</td>
<td>- Owns 39% of NZ’s Synlait Dairy - Sources raw materials from NZ’s Synlait for China - Bought Weetabix (UK) - Bought Manassen Foods (Australia) - Reported in talks to acquire largest dairy in Israel (Tnuva) for US$1.3b</td>
<td><a href="http://www.brightfood.com">http://www.brightfood.com</a> <a href="http://www.brightdairy.com">http://www.brightdairy.com</a></td>
<td></td>
</tr>
<tr>
<td>Bright Dairy</td>
<td></td>
<td>Subsidiary Publicly listed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1 Chinese owned Infant Formula brand</td>
<td></td>
<td></td>
<td>- Investing €20m into production venture with Kerry in Ireland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2 Chinese owned Infant Formula brand</td>
<td></td>
<td></td>
<td>- Investing €20m into production venture with Isigny Sainte Mere in France</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#9 Chinese owned infant formula brand</td>
<td></td>
<td></td>
<td>- Investing €100m into production venture with Sodiaal in France</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Investing elsewhere

| Firm | #1 Chinese owned Infant Formula brand | | |
|------|----------------------------------|----------------|-----------|-------------------------------------|---------|
| BeingMate | | | - Investing €20m into production venture with Kerry in Ireland |
| Biostime | #2 Chinese owned Infant Formula brand | | | |
| Synutra | #9 Chinese owned infant formula brand | | | |

Source: Coriolis from a wide range of sources
### 3&4. BULK FORMULA/NICHE PRODUCTION

Six New Zealand firms now produce and wholesale bulk base infant formula powder

Identified firms in New Zealand producing bulk/base infant formula powder

<table>
<thead>
<tr>
<th>Year Founded</th>
<th>Year began producing base IF powder</th>
<th>Wholesale bulk base formula?</th>
<th>Can &amp; contract pack for others?</th>
<th>Sell branded infant formula?</th>
<th>Current predominant strategic position</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fonterra</strong></td>
<td>2001 Predecessor 1980's</td>
<td>Yes</td>
<td>Yes (only large)</td>
<td>Launching</td>
<td>Bulk formula Developing brand</td>
</tr>
<tr>
<td><strong>Dairy Goat Co-operative</strong></td>
<td>1989 2003</td>
<td>Yes (goat)</td>
<td>Yes (goat)</td>
<td>Yes (goat)</td>
<td>Niche products</td>
</tr>
<tr>
<td><strong>Synlait</strong></td>
<td>2000 2011</td>
<td>Yes</td>
<td>No (?)</td>
<td>Yes</td>
<td>Bulk formula Developing brand</td>
</tr>
<tr>
<td><strong>Westland New Zealand</strong></td>
<td>1937 2012</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Bulk formula</td>
</tr>
<tr>
<td><strong>Gardians</strong></td>
<td>2011 2012</td>
<td>Yes</td>
<td>Yes (Sutton)</td>
<td>Yes</td>
<td>Bulk formula Developing brand</td>
</tr>
<tr>
<td><strong>New Image Group</strong></td>
<td>1984 2011</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Bulk formula Developing brand</td>
</tr>
</tbody>
</table>

3. **Bulk formula production**

4. **Niche products**
## 5. CONTRACT CANNING/PACKING

New Zealand has a wide range of infant formula dry blenders and canners, most of whom contract pack for others.

### Identified firms dry blending and canning Infant Formula in New Zealand

1980-2013+

<table>
<thead>
<tr>
<th>Firm</th>
<th>Plant location</th>
<th>Employees</th>
<th>Action</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fonterra/Canpac</td>
<td>Hamilton</td>
<td>251-500</td>
<td>Manufactures and prints can packaging for a wide range of dairy-based consumer products and food packaging. Contract packaging services and can printing</td>
<td><a href="http://www.fonterra.com">http://www.fonterra.com</a></td>
</tr>
<tr>
<td>Alpha Laboratories</td>
<td>Mt. Wellington, Auckland</td>
<td>150</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.alphalabs.co.nz/">http://www.alphalabs.co.nz/</a></td>
</tr>
<tr>
<td>Danone/Nutricia</td>
<td>Mt. Wellington, Auckland</td>
<td>51-100</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.nutricia.co.nz/">http://www.nutricia.co.nz/</a></td>
</tr>
<tr>
<td>Health Pak</td>
<td>Penrose, Auckland</td>
<td>51-100</td>
<td>- Pack small sachets</td>
<td><a href="http://www.healthpak.co.nz">http://www.healthpak.co.nz</a></td>
</tr>
<tr>
<td>Dairy Goat Co-op</td>
<td>Hamilton</td>
<td>51-100</td>
<td>- Wet, dry, canning</td>
<td><a href="http://www.dgc.co.nz/">http://www.dgc.co.nz/</a></td>
</tr>
<tr>
<td>Unitech Industries</td>
<td>Henderson, Auckland</td>
<td>80</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.unitech.co.nz/">http://www.unitech.co.nz/</a></td>
</tr>
<tr>
<td>New Image</td>
<td>Avondale, Auckland</td>
<td>21-50</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.newimageasia.com/">http://www.newimageasia.com/</a></td>
</tr>
<tr>
<td>Doxcon Pharmaceuticals</td>
<td>Henderson, Auckland</td>
<td>21-50</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.doxcon.co.nz/">http://www.doxcon.co.nz/</a></td>
</tr>
<tr>
<td>New Zealand Nutritional</td>
<td>Christchurch</td>
<td>21-50</td>
<td>- Dry blending and canning</td>
<td><a href="http://nznutritionals.co.nz/">http://nznutritionals.co.nz/</a></td>
</tr>
<tr>
<td>New Zealand New Milk</td>
<td>Auckland Airport, Auckland</td>
<td>N/A</td>
<td>- Dry blending and canning</td>
<td><a href="http://nznewmilk.co.nz/">http://nznewmilk.co.nz/</a></td>
</tr>
<tr>
<td>New Zealand Food Packing</td>
<td>Rosedale, Auckland</td>
<td>N/A</td>
<td>- Dry blending and canning</td>
<td><a href="http://www.nzfoodpacking.com/">http://www.nzfoodpacking.com/</a></td>
</tr>
</tbody>
</table>

Source: various published articles & press releases; Food & Beverage Information Project; Coriolis
6. PURE SALES & MARKETING

New Zealand has 100+ brands of infant formula being sold by “pure play” sales & marketing firms

EXAMPLES: Select pure-play sales & marketing organisations infant formula brands from New Zealand

Presence; as of August 2013
GROWING EXPORTS

New Zealand infant formula exports continue to grow, reaching ~NZ$400m in 2012

New Zealand infant formula and related valued-added milk-based powder exports by value
NZ$m; declared value FOB; 1988-2012

Source: Statistics New Zealand Infoshare database (custom job); Coriolis analysis and classification
The second section of this report looks at a representative global value chain for infant formula.

**A. Strategic situation facing the New Zealand infant formula industry**

- What is the big picture?
- What is the global situation?
- Where are New Zealand firms currently positioned?
- Why are New Zealand firms positioned where they are?
- What barriers do New Zealand firms face in infant formula specifically?

**B. Detailed and comprehensive representative global value chain for infant formula**

- Develop a detailed and representative value chain for New Zealand milk powder from the farm through to retail sale of infant formula to the consumer
  - Non-New Zealand production
  - New Zealand production
- Mapping, modelling and costing

**I. Infant formula global value chain research**

**II. UHT milk global value chain research**

**III. Insights for policy makers**

Separate document

Separate document
A range of key findings and conclusions come out of this analysis of the global infant formula value chain:

1. The value chain for infant formula starts with the consumer not the primary producer of any ingredient or raw material. The whole value chain moves, responds and adapts based on day-to-day purchase decisions made by millions of global consumers. Obviously these signals become muffled the further one gets from the consumer, but they cannot be ignored.

2. Most food & beverage categories are not like wine. In most categories, including infant formula, the consumer signals to the retailer that what they want is to choose from among a small number of large, well marketed brands manufactured by well known and trusted multinationals that have been in business for 100+ years.

3. All actors in the value chain have clearly defined roles and responsibilities. There is a common industry structure and value chain globally - with the same actors and roles occurring everywhere - signalling strong forces creating this structure.

4. Economies of scale are real. The firms in the value chain beyond New Zealand are large scale entities typically with a market capitalisation larger than Fonterra.

5. There is no wide and undefended pool of profitability sitting anywhere along the value chain just waiting to be devoured. At all stages of the chain, firms earn their profits through hard work, innovation, and execution.

6. More defensible positions – with strong barriers to entry – are more profitable and less defensible positions with lower barriers to entry are less profitable.

7. Deep and defensible industry profit pools – typically located around activities at scale - are protected by huge balance sheets.

8. Pro rata on a per can basis, the total infant formula value chain requires $44 worth of total assets to sell an product worth $44. This suggests that selling a lot more infant formula (e.g. to a new emerging market like India), will require a lot more assets in the total chain.

9. Shareholder’s return are generally proportional to assets, particularly across an economic cycle.

10. Stages of the chain beyond the farm gate and basic dairy processing are typically structured – in any given market or segment - as a small number of large firms, rather than a large number of small firms, signalling strong economies of scale.

11. The high defensibility and asset intensive nature of many positions further along the value chain acts as the single largest barrier to New Zealand firms changing position.

1. This is not to say the retailer does not have an incentive to reduce range but fundamentally in any given category the depth of choice offered is driven by the consumer.
The value chain for infant formula can be represented by the following simplified model:

**Value Chain Model**

**Dairy ingredients**
- Milk powder
- Whey protein
- Lactose

**Non-Dairy ingredients**
- Vegetable oils
- Minerals
- Vitamins
  (~45+ in total)

**Package**
- Tin (traditional)
- Plastic (emerging)

**Cardboard carton**
- Shipping carton for transport

**Support functions**

**Procurement**
- Sourcing
- Buying

**R&D**
- Product improvement
- Packaging improvement
- Process improvement
- Patents & other IP

**Support**
- Management
- Accounting & Finance
- Legal
- Human Resources
- Engineering

**Wet processing**
- Some ingredients processed wet
- Evaporator
- Spray dryer

**Dry blending**
- Some ingredients processed dry
- Dry blending equipment

**Canning & packing**
- Canning line
- Packing for distribution and export

**Marketing**
- To healthcare professionals
- To consumers (highly regulated)

**Sales**
- Healthcare professionals
- Retailers

**Logistics**
- Warehousing
- Order fulfilment
- Distribution management
- Documentation

**Channels**
- Hospitals
- Pharmacies
- Supermarkets
- Discounters
- Online
- Other

**Customers**
- Doctors/Nurses
- Mothers
- Other relatives
- Government agencies

*Note: Not all transport and logistics functions show on this diagram.*

1. For example two-thirds of all infant formula in the United States is purchased by the United States Department of Agriculture’s Special Supplemental Nutrition Program for Women, Infants and Children (WIC)
**INFANT FORMULA - THREE STAGES**

Abbott’s Nutritional plant in Cootehill Ireland gives a real world example of a tight, concise infant formula value chain in action

EXAMPLE: Real world value chain for Abbott Nutrition plant in Cootehill, Ireland

**Source:** Coriolis from a range of published accounts and sources

---

**Milk collection & processing**
- Turnover €184m (NZ$310m)
- Founded 1901
- 1,050 farmer shareholders
- Ireland & N. Ireland
- 500m litres
- 2 processing sites: Monaghan town site Artigarvan site (new 2012)
- 63% of volume to domestic market and Irish Dairy Board

**Non-Dairy ingredients**
- Vegetable oils
- Minerals & Vitamins
- Other (probiotics, etc.)

**Package**
- Tin (traditional)
- Plastic (emerging)
- Cardboard carton
- Shipping carton for transport

**Nutrition Products Manufacturing**
- Completely integrated facility; houses extensive laboratory facilities, process control systems and enterprise planning systems
- In operation 7 days per week, 24 hours per day, 3 x 8-hour shifts per day; only shuts down for the summer and Christmas shutdown periods for maintenance, normally for 2 week periods.
- Compliance to world-class systems i.e. ISO 9001:2008, ISO 22000, PAS220, ISO 14001, Abbott Corporate and Division Policies and local procedures; up to 150 quality control checks
- Meeting all applicable legislative, regulatory and customer Food Safety requirements through an effective Food Safety Management Programme
- Abbott doubled the capacity of the plant in 2006 with an investment of €88.5m

**Wet processing**
- Some ingredients must be processed wet
- Wet processing area
- Evaporator
- Spray dryers (2)

**Dry blending**
- Some ingredients must be processed dry
- Dry blending equipment

**Canning & packing**
- Canning line
- Packing for distribution and export

**Procurement**
- Sourcing
- Buying

**R&D**
- Product improvement
- Packaging improvement
- Process improvement
- Patents & other IP

**Support**
- Management
- Accounting & Finance
- Legal
- Human Resources

**Sales & Marketing**
- Abbott has ~70,000 employees globally
- Global Salesforce
- Sold by Abbott global salesforce to doctors, hospitals and retailers around the world

**Markets**
- 97% of plant production is sold outside Europe
- More than one third of its output is sold in South East Asia
- One quarter goes to the Middle East
- 12% each to China and Latin America
- Smaller amounts are sold to Israel, Canada, and Africa

---

**Abbott Ireland**
Plant in Cootehill Ireland
Opened 1975
250-300 employees
**INFANT FORMULA - DIFFERENT MODELS**

In New Zealand there are a range of models in place for splitting up this value chain.

**EXAMPLE: Simplified production process and supply chain**

*2012 or as available*

<table>
<thead>
<tr>
<th>Milk collection &amp; processing</th>
<th>Wet processing</th>
<th>Dry blending</th>
<th>Canning &amp; packing</th>
<th>Sales &amp; Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE: Abbott in Ireland</td>
<td><img src="image" alt="Abbott" /></td>
<td><img src="image" alt="Abbott" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXAMPLE: Abbott in Singapore</td>
<td><img src="image" alt="Abbott" /></td>
<td><img src="image" alt="Abbott" /></td>
<td><img src="image" alt="Fonterra" /></td>
<td><img src="image" alt="DANONE" /></td>
</tr>
<tr>
<td>Base powder to NZ multinational factory</td>
<td><img src="image" alt="Fonterra" /></td>
<td></td>
<td></td>
<td><img src="image" alt="NUTRICIA" /></td>
</tr>
<tr>
<td>Contract packed for global firm</td>
<td><img src="image" alt="Fonterra" /></td>
<td></td>
<td></td>
<td><img src="image" alt="Nestle" /></td>
</tr>
<tr>
<td>Local canner to smaller marketer</td>
<td><img src="image" alt="Fonterra" /></td>
<td><img src="image" alt="Westland" /></td>
<td><img src="image" alt="Gardians" /></td>
<td><img src="image" alt="GMP Pharmaceuticals" /></td>
</tr>
<tr>
<td>Local canner &amp; marketer</td>
<td><img src="image" alt="Fonterra" /></td>
<td><img src="image" alt="Westland" /></td>
<td><img src="image" alt="Gardians" /></td>
<td><img src="image" alt="UNITECH INDUSTRIES LIMITED" /></td>
</tr>
<tr>
<td>Integrated</td>
<td><img src="image" alt="Dairy Goat Co-operative" /></td>
<td><img src="image" alt="homecare" /></td>
<td><img src="image" alt="LOT CARE" /></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Coriolis from a range of published accounts and sources*
INFANT FORMULA VALUE CHAIN - MODEL

This analysis of the infant formula value chain uses a simplified value chain from the consumer in Asia through to the dairy farmer in New Zealand; at key stages as far as possible we use real firm’s financials as models.
Preliminary analysis of the infant formula value from retail in Asia through to the farm gate return shows most of the value being added beyond the New Zealand border.

Waterfall chart of value chain from retail shelf price of a can of infant formula through to farm gate value to dairy farmer in New Zealand.

NZ$: actual; 2012

Source: Coriolis
INFANT FORMULA VALUE CHAIN - MARKUP VS. EBITDA VS. ASSETS REQUIRED

Looking beyond markup by stage, into profitability (EBITDA) and nominal assets required to achieve the profit highlights relative returns along the chain; the low return of dairy farmers on their farm value stands out.

MODEL: Value chain of a nominal “can of infant formula”: markup to stage prior, EBITDA and assets required
NZ$; actual; 2012

Source: Coriolis
Looking at return on assets we find that all members of the value chain earn their returns:

- Retailer: 17%
- In-market logistics: 15%
- Multinational infant formula manufacturer: 29%
- Seafreight & insurance: 16%
- Dairy processor in New Zealand: 9%
- Dairy farmer in New Zealand: 7%

Source: Coriolis

Excludes returns on land value which have been very significant over the past decade; suggest factoring in land value change over the last decade would double this number.
VALUE CHAIN: THE CONSUMER

Our model value chain for infant formula starts with the consumer; in this case “the Wong family”, a typical Singaporean consumer of infant formula.

Christopher, Fann & Ong Wong
A “typical Singaporean family”

They are a dual income household with two working parents and one child. He works as an engineer and she works as an administrator in a mid-sized firm.

They make the average Singaporean household income, which is about $86,000 after tax.

They rent an 3 room flat from the Singaporean Government’s Housing and Development Board (HDB) as do 85% of Singaporeans.

Ong (the consumer) was born six months ago and is in day care, as Fann (the customer) can’t afford not to work. As a result Ong is fed infant formula.

Source: Singapore Department of Statistics “Report on the Household Expenditure Survey 2007/08”; adjusted for income growth to 2012; photo credit (iStock for project); Coriolis analysis
AVERAGE HOUSEHOLD EXPENDITURE

The average Singaporean household spends about S$3,900 per month, 22% goes on food; almost two-thirds of food expenditure is on eating out away from home; dairy products account for 4% of food spend.

Average Singaporean household expenditure per month

$S; % of $S; 2012 est

<table>
<thead>
<tr>
<th>Category</th>
<th>$S</th>
<th>% of $S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$616</td>
<td>16%</td>
</tr>
<tr>
<td>Housing/utilities</td>
<td>$874</td>
<td>4%</td>
</tr>
<tr>
<td>Health</td>
<td>$207</td>
<td>3%</td>
</tr>
<tr>
<td>Furnishings/repairs</td>
<td>$168</td>
<td>4%</td>
</tr>
<tr>
<td>Clothing</td>
<td>$129</td>
<td>3%</td>
</tr>
<tr>
<td>Recreational services</td>
<td>$339</td>
<td>9%</td>
</tr>
<tr>
<td>Communication services</td>
<td>$332</td>
<td>9%</td>
</tr>
<tr>
<td>Education services</td>
<td>$207</td>
<td>5%</td>
</tr>
<tr>
<td>Food</td>
<td>$842</td>
<td>22%</td>
</tr>
<tr>
<td>Fresh fruits</td>
<td>$31</td>
<td>4%</td>
</tr>
<tr>
<td>Fresh veg.</td>
<td>$39</td>
<td>5%</td>
</tr>
<tr>
<td>Meat</td>
<td>$56</td>
<td>7%</td>
</tr>
<tr>
<td>Seafood</td>
<td>$59</td>
<td>7%</td>
</tr>
<tr>
<td>Dairy</td>
<td>$32</td>
<td>4%</td>
</tr>
<tr>
<td>Eggs</td>
<td>$5</td>
<td>1%</td>
</tr>
<tr>
<td>Oil/fats</td>
<td>$9</td>
<td>1%</td>
</tr>
<tr>
<td>Rice</td>
<td>$15</td>
<td>2%</td>
</tr>
<tr>
<td>Bread</td>
<td>$17</td>
<td>2%</td>
</tr>
<tr>
<td>Other foods</td>
<td>$20</td>
<td>2%</td>
</tr>
<tr>
<td>Non-Alcoholic bev.</td>
<td>$21</td>
<td>3%</td>
</tr>
<tr>
<td>Alcoholic bev.</td>
<td>$12</td>
<td>1%</td>
</tr>
<tr>
<td>Hawker, food court</td>
<td>$342</td>
<td>41%</td>
</tr>
<tr>
<td>Rest. &amp; café</td>
<td>$141</td>
<td>17%</td>
</tr>
<tr>
<td>Total</td>
<td>$3,900</td>
<td>100%</td>
</tr>
</tbody>
</table>

AVERAGE Singaporean household expenditure per month on food & bev.

$S; % of $S; 2012 est

<table>
<thead>
<tr>
<th>Category</th>
<th>$S</th>
<th>% of $S</th>
</tr>
</thead>
<tbody>
<tr>
<td>At home</td>
<td>$316</td>
<td>38%</td>
</tr>
<tr>
<td>Away</td>
<td>$527</td>
<td>63%</td>
</tr>
<tr>
<td>Hawker, food court</td>
<td>$342</td>
<td>41%</td>
</tr>
<tr>
<td>Total</td>
<td>$842</td>
<td>100%</td>
</tr>
</tbody>
</table>

**IMPACT ON SPENDING**

Ong consumes a can of formula per week meaning the family spends about S$176 per month on infant formula; this had led to less spending elsewhere in the family budget.

**Ong Wong**  
(The consumer)

Consumes  
1x900g can/week  
4x900g can/month

At S$46/can= S$176/month

---

**Model: incremental food at home spending**  
S$; % of S%; 2012 est

- Infant formula: $176
- Typical: $316
- Wong family: $492

<table>
<thead>
<tr>
<th>Category</th>
<th>Typical</th>
<th>Wong family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alc. bev</td>
<td>$12</td>
<td></td>
</tr>
<tr>
<td>Non-alc bev.</td>
<td>$21</td>
<td></td>
</tr>
<tr>
<td>Other foods</td>
<td>$20</td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td>$17</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>$15</td>
<td></td>
</tr>
<tr>
<td>Oils &amp; fats</td>
<td>$8</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td>$32</td>
<td></td>
</tr>
<tr>
<td>Seafood</td>
<td>$59</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>$56</td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>$39</td>
<td></td>
</tr>
<tr>
<td>Fruit</td>
<td>$31</td>
<td></td>
</tr>
</tbody>
</table>
DOCTOR’S INFLUENCE ON BRAND DECISION

Fann buys Abbott’s Similac brand for Ong as this was recommended to her by her doctor, whom she consulted with when she decided to stop breastfeeding; Ong’s doctor is visited regularly by salespeople from the major infant formula suppliers in Singapore.

“Our sales force educates health care professionals about the benefits of our infant formula products in each of the countries where we market our infant formula products. Primary marketing efforts for infant formula products are directed toward securing the recommendation of the Enfa family of brands by physicians or other health care professionals.

We focus our product detailing efforts on neonatal intensive care units, physicians and other health care professionals, hospital group purchasing organizations and other integrated buying organizations. Our sales force receives training on our products and customer service skills.

We support health care professionals by organizing continuing medical education programs, symposia and other educational interfaces.” p6, Mead Johnson 10k, 2012

Source: photo credit (purchased from iStockphoto.com for project); Coriolis analysis
SALESFORCE FOCUS

The major global multinationals put a large part of their selling effort into health practitioners rather than retailers (as in normally the case in FMCG/CPG\(^1\)); they are doing this as it works to sell product

EXAMPLE: Mead Johnson global salesforce by focus target market for selling

\# of employees; 2010

Visit and sell to healthcare professionals
1,350
71%

Visit and sell to retailers
550
29%

Total = 1,900
salespeople
worldwide

“Prior to 1988, infant formula was marketed strictly as a pharmaceutical product. Given historical product loyalty, formula makers offered their products free to pediatricians and hospitals in the hopes that the first formula a mother used would be the one she continued to purchase.” Funding Universe

1. FMCG = Fast Moving Consumer Goods; CPG = Consumer Packaged Goods; (aka. Things with a bar code you put in a shopping cart); Source: Mead Johnson prospectus; Coriolis analysis
Like most people, the Wong family shop at the closest supermarket to their home - in their case a Cold Storage near the MRT station; Cold Storage is the #2 chain in Singapore.

**Supermarket market share by chain in Singapore**

% of supermarket/hypermarket sales; 2012

- **Cold Storage**: 47%
- **FairPrice**: 39%
- **Sheng Siong**: 10%
- **Others**: 4%

Source: photo credit (Cold Storage press photo); Coriolis from various published reports and accounts
### CONSOLIDATED MARKET

Singapore, like most markets its size, has a highly consolidated retail environment; Cold Storage is owned by Dairy Farm and the company owns and operates a range of stores around Singapore.

#### Major retail food store operators in Singapore (2010)

<table>
<thead>
<tr>
<th>Year founded</th>
<th># of stores</th>
<th>Ownership</th>
<th>Group sales</th>
<th>Store formats</th>
<th>Firm/Concept summary</th>
<th>Website</th>
</tr>
</thead>
</table>
| 1973         | 106 (s/h)   | Co-operative | $2.1b (2011) | FairPrice (95) [SM]  
FairPrice Finest (7) [SM]  
FairPrice Xtra (4) [HM]  
FairPrice Xpress (18+) [CS]  
Cheers (120+) [CS]  
Foodfare [Foodservice] | Owned by National Trades Union Congress (NTUC) itself owned by 60 unions (550,000 members) | www.fairprice.com.sg  
www.cheersstore.com/ |
| 1903         | 111 (s/h)   | Dairy Farm (HK) | -$1.7b (estimate) | Cold Storage (39) [SM]  
Market Place (6) [SM]  
Shop N Save (59) [SM]  
Giant (7) [HM]  
7-Eleven (549) [CS]  
Guardian (135) [Ph] | Singapore operations of Dairy Farm (listed; Hong Kong); former owner of Woolworths NZ | www.coldstorage.com.sg  
www.gianthypermarket.com.sg  
www.7-eleven.com.sg  
http://www.guardian.com.sg |
| 1985         | 23          | Private (Lim Hock Chee) | $0.5b (2009) | Sheng Siong (23) [SM/HM]  
Food Courts (5) | Local chain started by former wet market pork seller | www.shengsiong.com.sg |
| 1984         | 19          | Private | N/A | Prime (19) [SM] | Mid-sized supermarkets | www.primesupermarket.com |
| 1972         | 4           | Listed (SGX); 60% Japan parent | $0.3b² (2010) | Isetan (4) [DS]  
Scotts (1) [SM] | Japanese department store chain; 1 has supermarket | www.isetan.com.sg |
| 1973         | 1           | Private (Mustaq Ahmad) | N/A | Mustafa 1 [DS/HM] | Indian entrepreneur expands from clothes store to department store w/food | www.mustafa.com.sg |
| 1973         | 1           | Japan | N/A | Meidi-Ya 1 [SM] | Fresh food imported directly from Japan (1); other products local & imported | www.meidi-ya.com.sg  
www.meidi-ya-store.com |

1. Inside Isetan Orchard store; 2. Includes non-food sales; 3. Supermarket (SM), Hypermarket (HM), Convenience store (CS), Department store (DS), Pharmacy (P); 4. Source: various company websites; various company annual reports; published articles and websites; Coriolis analysis and estimates.
WHO OWNS THEIR SUPERMARKET?

Dairy Farm International is a multinational retail group based in Hong Kong with stores across the East/South East Asia region; Dairy Farm operates a range of store formats beyond supermarkets.

Operational structure of Dairy Farm International in Asia

US$m; As of FY2012

Sales $9,801m
OP $518m
Total Assets $3,851m

North Asia
Sales $4,997
OP $312

East Asia
Sales $2,864
OP $94

South Asia
Sales $2,275
OP $113

China

Taiwan

Malaysia

Indonesia

Vietnam

Brunei

Singapore

Cambodia

Philippines

India

HM
Hypermarts

SM
Supermarket

CS
Convenience Stores

HBC
Health & Beauty Stores

R
Restaurants

H
Home furnishings (e.g. Ikea)

Source: various Dairy Farm publications and reports; Dairy Farm websites; Coriolis analysis
Dairy Farm International’s share price has shown reasonable growth over the past decade and the company has a current market capitalisation of US$14.9b (or 172% of Fonterra’s current market cap)

Source: bigcharts.com (chart); ft.com (DFI and Fonterra market cap); Oanda (exchange rate NZ$ to US$); Coriolis analysis
**INFANT FORMULA RANGE**

Cold Storage stocks 14 different Stage 2 formula items from six different global multinationals; Fann begins the value chain by spending S$47.45 on Similac

Range of Stage 2 infant formula stocked by Cold Storage Singapore

*August 2013*

<table>
<thead>
<tr>
<th>800-900g</th>
<th>1.6-1.8kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>$40.50</td>
<td>$40.50</td>
</tr>
<tr>
<td>$43.90</td>
<td>$43.90</td>
</tr>
<tr>
<td>$73.90</td>
<td>$73.90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>800-900g</th>
<th>1.6-1.8kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>$42.75</td>
<td>$41.45</td>
</tr>
<tr>
<td>$37.55</td>
<td>$37.55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>800-900g</th>
<th>1.6-1.8kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>$43.05</td>
<td>$82.05</td>
</tr>
</tbody>
</table>

Source: Cold Storage online website (accessed August 2013); photo credit (fair use; low resolution; complete product/brand for illustrative purposes); Coriolis analysis
MODEL SUPERMARKET COST STRUCTURE

Two thirds (65%) of the selling price goes to the supplier, one fifth (21%) goes to pay for the staff, rent, utilities and other costs; a 4% EBIT goes to shareholders and 8% goes to government.

RETAILER MODEL: Estimated model of net selling price through to shareholders return of a can of infant formula sold through a Singapore supermarket

$\text{S$; actual; 2012}$

Financials given here based primarily on the financial data of:

Source: Dairy Farm International annual report 2012; past Coriolis research; Coriolis estimates and analysis
### MODEL COST STRUCTURE - SUPERMARKET - SOURCES & KEY ASSUMPTIONS

The model cost structure used for the retail component of a 900g can of infant formula was built using the following sources and assumptions.

#### RETAILER MODEL: Details of key elements and assumptions in model cost structure

2012/13

<table>
<thead>
<tr>
<th>Issue</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key data source(s) used</td>
<td>- Dairy Farm Annual Report 2012 (Dairy Farm is #2 supermarket retailer in Singapore)</td>
</tr>
<tr>
<td></td>
<td>- Dairy Farm website and advertising</td>
</tr>
<tr>
<td></td>
<td>- Other Singapore retailer’s annual reports, websites and advertising; various published articles</td>
</tr>
<tr>
<td></td>
<td>- Industry interviews; guidance from reviewers</td>
</tr>
<tr>
<td>Key assumptions</td>
<td>- Modelling a retail price of S$47.50 per can leading to a S$40.92 average annual wholesale price paid by the retailer and a retail gross margin of 28% plus 7% GST</td>
</tr>
<tr>
<td></td>
<td>- GST of 7% applies to retail shelf price of infant formula in Singapore; ignoring GST from here on in the value chain (assuming it is a wash)</td>
</tr>
<tr>
<td></td>
<td>- The overall retail P&amp;L cost structure and profitability of a retailer selling 18,000-20,000 items can be used to represent pro rata the cost structure of a specific item (900g infant formula can) from sales value (ex. tax) through to shareholder return</td>
</tr>
<tr>
<td></td>
<td>- Sales consist of the net value of goods sold to customers, net of returns, discounts and sales taxes</td>
</tr>
<tr>
<td>Not modelled</td>
<td>- Promotional and advertising allowances not modelled, as from the point-of-view of the retailers accounting sales are net of these (in other words we are assuming an average annual net net price)</td>
</tr>
<tr>
<td>Transport from stage prior</td>
<td>- Assuming product is delivered to store by truck</td>
</tr>
<tr>
<td></td>
<td>- Cost paid by retailer is inclusive of delivery</td>
</tr>
<tr>
<td></td>
<td>- Delivery is paid by supplier and comes out of their SG&amp;A</td>
</tr>
</tbody>
</table>
**VALUE CHAIN: THE MANUFACTURER - ABBOTT NUTRITION - PLANT IN SINGAPORE**

The can of Similac that Fann purchased from Cold Storage supermarket was manufactured in Abbot Nutrition’s plant in Singapore, built in 2007 at a cost of US$280m *equivalent to the total assets of Westland*.

**Abbott Nutrition plant in Singapore**
*(Opened 2008)*

"[Abbott’s Singapore plant] is is the largest investment ever made by the company in nutritional products, as well as its first major investment in Asia and the biggest investment made by a single company in a nutritional plant in Singapore. The facility employs over 300 people.

The facility produces 45 million kilograms of powder nutritional products, including infant formula, follow-on formula and growing-up milk. It serves one million infants and children in Asia annually. The products from Abbott are shipped to China, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Vietnam and the Middle East...

Abbott says its decision to set up facilities in Singapore was prompted by the availability of skilled workforce, food safety and quality standards, and infrastructure such as ports. In addition, the AMS nutritional facility enables faster shipment of products to Asian countries...

The facility is completely integrated and houses extensive laboratory facilities, process control systems and enterprise planning systems. The manufacturing process at the facility involves wet processing, evaporation, spray drying, blending and packaging.

Wet processing involves mechanically removing the outer skin of the raw material. The raw material is then dried up. The spray drying process is used to produce dry powder with the help of hot gas.

[The plant] produces nutritional products for infants and children. It manufactures Similac, Gain, Gain Plus, Grow, Grow School and PediaSure Complete. Similac is a nutritional product intended for infants aged up to six months, while Gain is for babies aged six months and older.

Gain Plus targets children aged one year and above. It is intended to help in visual as well as physical development, support the growth of brain and increase immunity. It also provides prebiotics to maintain a healthy digestive system.

Grow is nutritional milk, which helps in the physical and cognitive growth of children aged three years and above. Grow School is also a milk product for children aged six and above. PediaSure is a complete nutritional product, which helps growing children aged one to ten.

The facility is located in the Tuas Biomedical Park II (TBP). TBP II is a 188ha facility located at Tuas View, 20 minutes from Jurong Port, Singapore. Situated in the west end of Singapore, TBP is a biomedical manufacturing centre that houses facilities of important world players in the biomedical field. The centre includes all the necessary amenities and infrastructure such as roads, power lines and telecommunication lines."

*Food Processing Technology website, accessed Aug 2013*

**Key operations:** Wet processing, Evaporation, Spray drying, Blending, Packaging

**Produced:** Infant formula, Other nutritional powders

**Investment:** US$280m (S$450m)

**Location:** Tuas Biomedical Park 2, Singapore

**Floor area:** 52,222 square metres

**Year opened:** 2008

**Employment:** 300+ people

**Brands:** Similac Advance®, Gain®, Pediasure® and Grow®.

**Key raw materials:** skim milk powder (100% imported), lactose, oils, cans, cardboard packaging.
ABBOTT NUTRITION – LOCATION OF PLANTS

The Singapore plant is one of 14 Abbott Nutrition manufacturing plants around the world.

Location of Abbott Nutrition’s plants
(2012)

- Cootehill, Ireland
- Granada, Spain
- Zwolle, Netherlands
- Fairfield, California
- Singapore
- Jiaxing, China
- Guangzhou, China
- Sligo, Ireland
- Brockville, Canada
- Altavista, Virginia
- Tipp City, Ohio
- Casa Grande, Arizona
- Sturgis, Michigan
- Columbus, Ohio
- Altavista, Virginia

Source: Abbott Nutrition website; Abbott Nutrition 10k; various published articles and reports; Coriolis analysis
# ABBOTT NUTRITION – LOCATION OF PLANTS

Abbott Nutrition’s 14 manufacturing plants range in size; not all manufacturing plants produce all products.

## Details of Abbott Nutritional plants around the world

(2012 or as available)

<table>
<thead>
<tr>
<th>Region</th>
<th>Nutritionals plant location</th>
<th>Product</th>
<th># of employees at this location</th>
<th>Year opened</th>
<th>Other available details</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Altavista, Virginia</td>
<td>Nutritional drinks</td>
<td>700</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brockville, Canada</td>
<td>Infant formula</td>
<td>160</td>
<td>N/A</td>
<td>Strike in 2009; exports to 30 countries; being closed 2013/14</td>
</tr>
<tr>
<td></td>
<td>Casa Grande, Arizona</td>
<td>Infant formula Nutritional drinks</td>
<td>425</td>
<td>1985</td>
<td>Added capacity in 2003</td>
</tr>
<tr>
<td></td>
<td>Columbus, Ohio</td>
<td>Nutritional drinks</td>
<td>TBD</td>
<td>N/A</td>
<td>Location of Nutrition division HQ</td>
</tr>
<tr>
<td></td>
<td>Fairfield, California</td>
<td>Various nutrition</td>
<td>200</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sturgis, Michigan</td>
<td>Various nutrition</td>
<td>-700</td>
<td>N/A</td>
<td>“Insect part” driven product recall in 2010; lost US$100m</td>
</tr>
<tr>
<td></td>
<td>Tipp City, Ohio</td>
<td>Nutritional drinks</td>
<td>240 when open</td>
<td>2014</td>
<td>Produce nutritional drinks for US market</td>
</tr>
<tr>
<td>Europe</td>
<td>Cootehill, Ireland</td>
<td>Infant formula</td>
<td>120</td>
<td>1975</td>
<td>Established 1975; Abbott’s largest single IF factory</td>
</tr>
<tr>
<td></td>
<td>Sligo, Ireland</td>
<td>Enteral (tube) feeding</td>
<td>TBD</td>
<td>1974</td>
<td>Established 1974</td>
</tr>
<tr>
<td></td>
<td>Granada, Spain</td>
<td>Infant formula</td>
<td>TBD</td>
<td>[1994]</td>
<td>Part of 1994 acquisition of Lacto Puleva's nutrition division</td>
</tr>
<tr>
<td>Asia</td>
<td>Zwolle, Netherlands</td>
<td>Infant formula</td>
<td>TBD</td>
<td>N/A</td>
<td>30+ different food products produced</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>Infant formula</td>
<td>200+</td>
<td>2007</td>
<td>Singapore has no cows</td>
</tr>
<tr>
<td></td>
<td>Guangzhou, China</td>
<td>Infant formula</td>
<td>TBD</td>
<td>2009</td>
<td>Appears to use 100% NZ milk powder</td>
</tr>
<tr>
<td></td>
<td>Jiaxing, China</td>
<td>Infant formula</td>
<td>300 when open</td>
<td>2014</td>
<td>New plant to serve Northern China market</td>
</tr>
</tbody>
</table>

Source: Abbott Nutrition website; Abbott Nutrition 10k; various published articles and reports; Coriolis analysis
MODEL COST STRUCTURE - MANUFACTURER

About a third (38%) of the ex-factory price of a can of infant formula goes to pay for the product, a third (38%) to operating costs and a seventh (16%) to shareholders and retained earnings.

MANUFACTURER MODEL: Estimated model of wholesale price (ex. local logistics) through to shareholders return of a can of infant formula sold S$; actual; 2012.

Financials given here based primarily on the financial data of:

Note: Not shown is an in-Singapore logistics charge of $0.31.

Return on total assets (EBITDA/total assets) 29%

Operating costs $11.53 38%

EBITDA $7.43 24%

Shareholders & retained earnings $4.81 16%

Interest expense $0.51 2%

Depreciation & amortisation $0.60 2%

Research & development $0.75 2%

Other expenses $0.16 0%

Income tax $1.51 5%

Gross margin $4.34 14%

Advertising & promotion

Selling, general & administrative $6.28 20%

Packaging $2.33 8%

Cost of products sold 38%

Other ingredients $4.20 14%

Dairy products $5.13 17%

Total = $30.61/can

Source: Abbott 10k 2012; Mead Johnson 10k 2012; past Coriolis research; Coriolis research & estimates.
The model cost structure used for the manufacturing component of a 900g can of infant formula was built using the following sources and assumptions:

### MANUFACTURER MODEL: Details of key elements and assumptions in model cost structure 2012/13

<table>
<thead>
<tr>
<th>Issue</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key data source(s) used</strong></td>
<td>- Mead Johnson Annual Report 2012 (Mead Johnson is the global #3 infant formula manufacturer and the only large listed pure-play multinational infant formula manufacturer (therefore its financials give the purest view of the cost structure of the industry)</td>
</tr>
<tr>
<td></td>
<td>- Abbott 10k and Annual report 2012 (used to cross check Mead Johnson where possible)</td>
</tr>
<tr>
<td></td>
<td>- Nestle, Danone, Mead Johnson, &amp; Abbott websites and promotional materials</td>
</tr>
<tr>
<td></td>
<td>- Material from other infant formula manufacturers websites and advertising; various published articles</td>
</tr>
<tr>
<td></td>
<td>- Industry interviews; guidance from reviewers</td>
</tr>
<tr>
<td><strong>Key assumptions</strong></td>
<td>- The overall P&amp;L cost structure and profitability of an infant formula manufacturer can be used to represent pro rata the cost structure of a specific item (900g can) from sales value through to shareholder return</td>
</tr>
<tr>
<td></td>
<td>- For a large multinational producer at scale, the cost of raw materials is ~45% dairy; 37% all other ingredients and 21% packaging</td>
</tr>
<tr>
<td></td>
<td>- Sales consist of the net value of goods sold to customers, net of returns, discounts and sales taxes</td>
</tr>
<tr>
<td></td>
<td>- We are assuming all dairy ingredients came from New Zealand; in practice all manufacturers in Singapore source dairy ingredients from a range of countries (i.e. reality is more complex)</td>
</tr>
<tr>
<td></td>
<td>- Assuming net effect of payment terms</td>
</tr>
<tr>
<td><strong>Not modelled</strong></td>
<td>- Complex item level costs</td>
</tr>
<tr>
<td><strong>Transport from stage prior</strong></td>
<td>- Assuming dairy ingredients are received by ship into Singapore and delivered to the factory</td>
</tr>
<tr>
<td></td>
<td>- Assuming all costs ex-dock paid by manufacturer and included in given cost structure</td>
</tr>
<tr>
<td></td>
<td>- Ingredient dairy price is CIF</td>
</tr>
<tr>
<td></td>
<td>- Cost of insurance and freight for transport from New Zealand dock to Singapore is assumed to be the difference between NZ FOB ($/kg) and Singapore CIF ($/kg)</td>
</tr>
</tbody>
</table>
### VALUE CHAIN: THE DAIRY PROCESSORS - KEY INGREDIENTS - DAIRY & OTHERWISE

Infant formula contains a range of ingredients designed to mimic human breast milk as closely as possible; three key ingredients are dairy based (nonfat milk powder, whey protein and lactose)

#### Key ingredients in infant formula

<table>
<thead>
<tr>
<th>Ingredient category</th>
<th>Details</th>
<th>Key ingredients Dairy</th>
<th>Non-dairy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>From cow’s milk that is processed to have a profile similar to human milk</td>
<td>Nonfat milk powder, Whey protein</td>
<td>-</td>
</tr>
<tr>
<td>Fats</td>
<td>a blend of vegetable fats (including DHA/ARA) to replace bovine milk fat in order to better resemble the composition of human milk</td>
<td>-</td>
<td>High Oleic Safflower Oil, Soy Oil, Coconut Oil</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>generally lactose from cow’s milk</td>
<td>Lactose</td>
<td>-</td>
</tr>
<tr>
<td>Vitamins, minerals &amp; other</td>
<td>“micronutrient” pre-mix that is blended into the product to meet the specific needs of the infant at a given age</td>
<td>-</td>
<td>Galactooligosaccharides (though made from lactose), C. Cohnii Oil, M. Alpina Oil, Beta-Carotene, Lutein, Lycopene, Ascorbic Acid, Soy Lecithin, Monoglycerides, Potassium Citrate, Calcium Carbonate, Potassium Chloride, Carageenan, Ferrous Sulfate, Magnesium Chloride, Choline Chloride, Choline Bitartrate, Taurine, m-Inositol, Calcium Phosphate, Zinc Sulfate, Potassium Phosphate, d-Alpha-Tocopheryl Acetate, Niacinamide, Calcium Pantothenate, L-Carnitine, Vitamin A Palmitate, Cupric Sulfate, Thiamine Chloride Hydrochloride, Riboflavin, Pyridoxine Hydrochloride, Folic Acid, Manganese Sulfate, Phyloquinone, Biotin, Sodium Selenate, Vitamin D3, Cyanocobalamin, Salt, Potassium Hydroxide, and Nucleotides (Adenosine 5’-Monophosphate, Cytidine 5’-Monophosphate, Disodium Guanosine 5’-Monophosphate, Disodium Uridine 5’-Monophosphate), others</td>
</tr>
</tbody>
</table>

Source: Mead Johnson 10k 2012; Coriolis from various ingredient labels
Singapore sources these three key dairy ingredients from a range of developed countries; New Zealand is a major supplier, but certainly not the only supplier

**Total Singapore import value of three key dairy ingredients in infant formula by source country**  
*US$m; 2012*

Source: UN Comtrade database (custom job); Coriolis classification and analysis
[For the purposes of this value chain we are assuming that...] the dairy products used in Fann’s can of infant formula came from Westland Co-operative dairy on the West Coast of the South Island of New Zealand.

Westland Milk Products factory in Hokitika, New Zealand

2012

Location: Hokitika
New Zealand

Key operations: Wet processing
Evaporation
Spray drying
Blending
Packaging

Produced: Milk powder
Milk proteins (whey, casein, other)
Butter
Colostrum, lactoferrin
Milk fats
Dairy nutritionals

Brands: Westland Milk Products, Westgold, Westpro Ingredients, EasiYo

Employment: 200+ people

Volume: 515m litres of milk (2012)

Suppliers: 330+ dairy farmers (Co-operative owners)
## MODEL COST STRUCTURE - DAIRY PROCESSOR - SOURCES & KEY ASSUMPTIONS

The model cost structure used for the dairy processor component of a 900g can of infant formula was built using the following sources and assumptions

### DAIRY PROCESSOR MODEL: Details of key elements and assumptions in model cost structure

| 2012/13 |

<table>
<thead>
<tr>
<th>Issue</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key data source(s) used</td>
<td>- Westland Annual Report 2012 (Westland is #2 New Zealand dairy processor by sales and volume)</td>
</tr>
<tr>
<td></td>
<td>- Westland website and promotional materials</td>
</tr>
<tr>
<td></td>
<td>- Checked against other key New Zealand dairy processor’s annual reports</td>
</tr>
<tr>
<td></td>
<td>- Other New Zealand dairy processor websites and advertising; various published articles</td>
</tr>
<tr>
<td></td>
<td>- Industry interviews; guidance from reviewers</td>
</tr>
<tr>
<td>Key assumptions</td>
<td>- The overall retail P&amp;L cost structure and profitability of a dairy processor can be used to represent pro rata the cost structure of a specific item (IF ingredients) from sales value through to shareholder return</td>
</tr>
<tr>
<td></td>
<td>- Sales consist of the net value of goods sold to customers, net of returns, discounts and sales taxes</td>
</tr>
<tr>
<td></td>
<td>- We are assuming all dairy ingredients came from New Zealand (we are aware reality is more complex)</td>
</tr>
<tr>
<td></td>
<td>- Assuming no Abbott/Singapore specific net effect of payment terms/letter of credit, etc. (i.e. no risk premium)</td>
</tr>
<tr>
<td></td>
<td>- Assuming dairy ingredients are sold FOB New Zealand</td>
</tr>
<tr>
<td></td>
<td>- Ingredient dairy price is FOB; in-market manufacturer pays CIF</td>
</tr>
<tr>
<td></td>
<td>- Cost of insurance and freight for transport from New Zealand dock to Singapore is assumed to be the difference between NZ FOB ($/kg) and Philippines CIF ($/kg)</td>
</tr>
<tr>
<td>Not modelled</td>
<td>- Complex item level costs</td>
</tr>
<tr>
<td>Transport from stage prior</td>
<td>- Assuming all internal New Zealand transport costs paid by dairy processor and included in given cost structure (given distribution expense)</td>
</tr>
</tbody>
</table>
The milk that Westland processed was supplied by its 330+ co-operative shareholder farmers.

| Location: | West Coast region New Zealand |
| # of dairy cows: | 173,651 (132,716 in milk or calf) [June 2012] |
| # of herds: | 374 (464 total cows/herd; 355 cows/herd in milk) |
| Area farmed: | 67,364 effective hectares |
| Cows/hectare: | 2.6 |
| Volume: | 587m litres of milk |
| Milk/herd: | 1.57m litres |
| Milk/cow: | 4,423l/cow in milk (or 85 families buying 1L of milk per week) |
| Suppliers: | 330+ dairy farmers (Co-operative owners) |
MODEL COST STRUCTURE - DAIRY FARMER

Slightly more than half (56%) of the farm gate price goes to costs; farm EBITDA margin is 44%, which is split amongst banks, shareholders and the government.

DAIRY FARMER MODEL: Estimated return to dairy farmer through to shareholders return on the dairy component of a can of infant formula sold NZ$; actual; 2012

Return on total assets (EBITDA/total assets) 7%

Financials given here based primarily on the financial data from:

Source: MPI Dairy Financial Model (uses Canterbury as West Coast not available on MPI website); Coriolis classification and analysis
MODEL COST STRUCTURE - DAIRY FARMER - SOURCES & KEY ASSUMPTIONS

The model cost structure used for the dairy farmer component of a 900g can of infant formula was built using the following sources and assumptions

DAIRY FARMER MODEL: Details of key elements and assumptions in model cost structure

<table>
<thead>
<tr>
<th>Issue</th>
<th>Details</th>
</tr>
</thead>
</table>
| Key data source(s) used      | - New Zealand Ministry for Primary Industries (MPI) Farm Monitoring 2012 Canterbury dairy report  
                                - Checked against other New Zealand dairy regions and national  
                                - Industry interviews; guidance from reviewers                                                                                               |
| Key assumptions              | - A model Canterbury dairy farm can be used as a model West Coast dairy farm (as MPI does not produce a West Coast Model); perhaps it is a new supplier to Westland’s Canterbury expansion  
                                - Dairy farmer is a member shareholder of a co-operative dairy company  
                                - Assuming dairy collection is paid out of dairy processor P&L  
                                - The overall retail P&L cost structure and profitability of a dairy farmer can be used to represent pro rata the cost structure of a specific item (900g can of infant formula) from sales value through to shareholder return |
| Not modelled                 | - Relative profitability of components of raw milk, both those that go into infant formula and those sold elsewhere  
                                - Complex item level costs                                                                                                                                                                                     |
| Transport from stage prior  | - None                                                                                                                                                                                                 |

2012/13
If the multinational moved production of the infant formula to New Zealand (the alternative scenario), we project the new value chain as follows; the key change is more value added in New Zealand.

Value chain of a can of infant formula through to farm gate value in New Zealand: base and alternative scenario
NZ$; actual; 2012

**Alternative Scenario: Multinational moves production to New Zealand**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Global multinational moves some of its global production of infant formula to New Zealand by building a plant in the country</th>
</tr>
</thead>
<tbody>
<tr>
<td>What changes?</td>
<td>Location of production</td>
</tr>
<tr>
<td>What stays the same?</td>
<td>Same manufacturer</td>
</tr>
<tr>
<td></td>
<td>Same retail price</td>
</tr>
<tr>
<td>Outcomes for New Zealand</td>
<td>Investment in a new infant formula factory (US$250-300m)</td>
</tr>
<tr>
<td></td>
<td>Imports of non-dairy IF ingredients increase</td>
</tr>
<tr>
<td></td>
<td>Exports of infant formula increase</td>
</tr>
<tr>
<td>Arguments for</td>
<td>Reduce double shipping</td>
</tr>
<tr>
<td></td>
<td>Potential to label “product of New Zealand”</td>
</tr>
<tr>
<td>Arguments against</td>
<td>Distance to market (speed to market, etc.)</td>
</tr>
<tr>
<td></td>
<td>Shipping cardboard and packaging (rather than bulk powder)</td>
</tr>
<tr>
<td></td>
<td>Tariff and trade barriers into some markets</td>
</tr>
<tr>
<td>Key assumptions</td>
<td>Treating freight as a wash (higher volume from NZ offset by no double shipping from Singapore onward to other markets)</td>
</tr>
<tr>
<td></td>
<td>Roughly 50% of manufacturer costs stays in NZ (materials plus half of SGA); not factored for increased imports</td>
</tr>
<tr>
<td></td>
<td>All ingredients other than dairy are imported</td>
</tr>
</tbody>
</table>

Source: Coriolis