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Insight

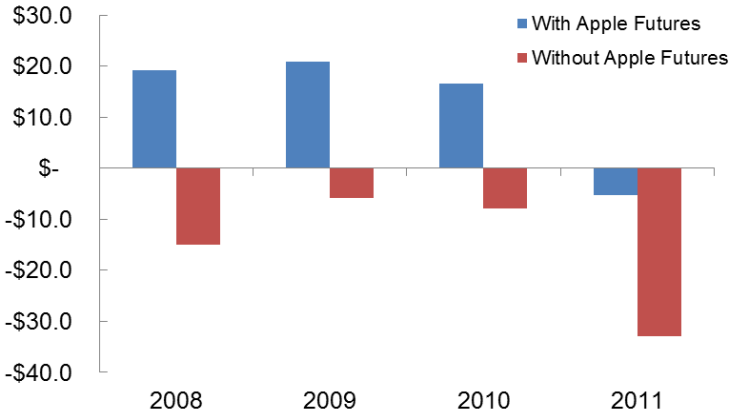
Apple industry gained millions through science and marketing

Consumers, supermarkets and distributors in Germany and the United Kingdom have been demanding reduced chemical use on fruit. The innovative growing programme 'Apple Futures' brought scientists and growers together to figure out how to reduce sprays and residues while producing export-quality fruit. Analysis from NZIER found that the research programme preserved between $25m and $35m per year of industry net income from 2008 to 2011, at a research cost of $3.2m. In just four years, the apple industry earned up to an extra $113m by reducing chemical residues to one-tenth of the maximum set by the European Union.

During the programme, Pipfruit New Zealand and individual exporters kept overseas buyers informed of the new research and the results being achieved. The industry credits this work with keeping important export markets open to New Zealand fruit.

Estimated net income for pipfruit industry

Millions of NZ$



Source: NZIER

An industry in trouble[1]

The United Kingdom and Europe are major markets for New Zealand apples, and historically have been a premium market. Together, they account for 65 percent of apple export volumes. United Kingdom and German buyers are influential buyers, setting trends that other markets follow.

[1] Bevin, S. (2007). National and Regional Economic Impacts of the Pipfruit Industry. Napier: Economic Solutions, Ltd., April. Innomarc Consulting Ltd. (2006). 'Smarter, Faster, Better – Leading Niche Player': A Development Strategy for the New Zealand Pipfruit Industry. Wellington, December and Park, NM and Walker, JTS. (2011). Apple Futures 2008-2010 Final Report. Report prepared for Pipfruit New Zealand Inc. Havelock North: Plant and Food Research Ltd, September.

New Zealand's position in these premium markets has slipped in recent years. Contributing to the decline is increased competition from other producers, particularly in South America, and increased market access requirements in the European Union (EU).

To ensure New Zealand apples remain competitive, the industry decided to focus on reducing chemical residues on fruit. The number of permitted agrichemicals in the EU has fallen from around 1,100 to around 300, according to Pipfruit NZ. At the same time, although the European regulators set a Maximum Residue Level (MRL), the pesticide residue thresholds being set by some European buyers are far below these MRLs. These thresholds might be 33% to 80% of EU regulations, with no more than three active ingredients allowed per residue test. Supermarkets are using low residues as a point of difference – a marketing tool.

Scientists and growers working together

The goal of Apple Futures was to develop guidelines for growing ultra-low residue fruit, focusing on the apple varieties preferred in Europe. These guidelines would allow growers to produce fruit with residues of less than 10% of the European MRLs. The programme included regimes for testing fruit for residues, a database of residues and spray diaries, grower discussion groups, technical advice from Plant and Food Research and Pipfruit NZ, and seminars that included growers, scientists, industry consultants, and suppliers.

The research investigated the impacts of different agrichemicals and spray regimes on fruit quality and spray residues. By collecting data from the main apple-growing areas, scientists were able to determine the best times to apply sprays. Growers used these findings to figure out what worked best for their own orchards. Managing sprays in the orchard, growers needed to:

- develop more complex spray plans, especially late in the season
- carefully monitor spray clearance dates
- make on-going decisions about which markets to target.

The economic benefit

NZIER estimated the economic benefits of the Apple Futures programme. The industry benefitted from maintaining access to key markets. The first table below provides summary findings for the assessment. We estimated that, in each year of the programme, industry net income (revenues less costs) would have been between $25m and $35m lower without Apple Futures. These figures represent between 7 percent and 10 percent of the industry's revenue, or between 15 percent and 25 percent of the industry's revenue from Northern Europe. Totalled over the four years, the economic benefit of Apple Futures was $113m.[1]

The results of the analysis can also be summarised with a benefit cost ratio (BCR). This is a ratio of the benefits produced by a programme to its costs. A ratio greater than 1.0 indicates that benefits are higher than costs. We use BCRs to summarise our sensitivity test on the estimated benefits, and these are shown in the second table below. The highest BCR was 35.39, assuming that Northern Europe would not accept any standard (IFP) apples[2] from New Zealand and that consumers had a typical price sensitivity[3]. This figure indicates that the value of the programme was over 30 times its cost. With the most relaxed assumptions, the impact of Apple Futures was $15.0m and the BCR was 4.68. Because the BCR is greater than 1.0 regardless of the assumptions used, the programme is almost certain to have produced significant benefits for the industry.

[1] A net present value calculation was not applied to these figures. The important variables in the analysis are the size of the lost export markets and the price sensitivity of overseas markets. Discounting would have a minor effect and would not change the central findings of the analysis.
[2] At the time, the standard production system for apples was the Integrated Fruit Production (IFP) programme.
[3] Durham, C. and Eales, J. (2006). Demand elasticities for fresh fruit at the retail level. Presentation to the Federal Trade Commission, 17 October. http://www.ftc.gov/be/seminardocs/061012DurhamEales.pdf.

Economic impact of Apple Futures

	2008	2009	2010	2011	Total
Industry returns with Apple Futures (revenue less production costs)	$ 19.2m	$ 20.9m	$ 16.5m	-$ 5.2m	$51.4m
Industry returns without Apple Futures (revenue less production costs)	-$ 15.1m	-$ 5.9m	-$ 8.0m	-$ 32.9m	-$ 61.8m
Difference	-$ 34.3m	-$ 26.8m	-$ 24.5m	-$ 27.6m	-$113.2m

Source: NZIER

Benefit cost ratios (BCRs) for Apple Futures

For different values of lost export markets and price elasticity

	Per cent closure to IFP fruit in Northern European export markets			
Elasticity	**100 % (base)**	**75 %**	**50 %**	**25 %**
-0.3 (base)	**35.39**	24.28	19.15	11.35
-0.5	30.29	19.97	12.19	6.79
-0.7	25.32	14.43	8.44	4.68

Note: *Elasticity* is the price elasticity of demand, which measures the price sensitivity of consumers.

Source: NZIER

The economic assessment tool used to evaluate the Apple Futures project can be used for future work. It connects three things:

- the costs and method of production
- the outputs from the industry
- the markets for those outputs.

NZIER can work with scientists to estimate the costs of using an innovation in producing fruit, and then use the assessment tool to estimate the potential market impacts.

We see this approach as particularly useful for comparing and prioritising science research. Some research may be focused on new varieties, while other research focuses on market acceptability or cost reduction. All of these pieces of research can be turned into inputs into this assessment tool, and their expected impacts on the industry can be compared. The result is empirically grounded and consistent estimates of potential impacts.

We also believe that the general approach can be extended to other agricultural industries, allowing them to improve their innovation processes and economic performance.

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This Insight was written by Bill Kaye-Blake, Principal Economist at NZIER, June 2012
For further information please contact Bill on bill.kaye-blake@nzier.org.nz.

NZIER | (04) 472 1880 | econ@nzier.org.nz | PO Box 3479 Wellington