

AgScience



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Biosecurity – assessing the risks

IN JULY LAST YEAR NZIAHS hosted a one day forum entitled 'Biosecurity – have we gone soft at the border?' The title was deliberately provocative, not just to attract criticisms of the Ministry for Primary Industries but rather to ask industry, researchers, regulatory bodies and politicians how are we doing? Are we giving this critical area enough thought and backing to make sure that our primary industries and the uniqueness of our environment and flora and fauna are properly protected?

The forum covered a diverse range of topics and while the focus was on primary industry, the range of speakers reflected the extent to which biosecurity makes an impact. In this issue, we summarise presentations from some of the speakers at the forum. Power point presentations from our other speakers can be viewed on our website www.agscience.org.nz.

We were pleased to welcome the Minister for Primary Industries, Nathan Guy, to open the forum. He challenged us on the title of the forum, suggesting it was too simplistic to cover all of the aspects involved in biosecurity. He also assured us that money had not been cut from the biosecurity budget and that biosecurity was the number one priority for his ministry. He emphasised that we are a trading nation and it is simply not possible just to shut our borders. It is all about risk management.

Despite the assurances from the Minister, recent incursions of the varroa mite, the tomato potato psyllid, the giant white butterfly and *Psa* suggest that our biosecurity system is not as secure as we might wish. But our speakers uniformly acknowledged that biosecurity is vital to New Zealand and to the particular industry or sector that they represented. There were some sobering figures presented in terms of the impact of *Psa* on the kiwifruit crop, only half the number of trays of gold kiwifruit were harvested in 2012, compared with the years before the arrival of *Psa*. The associated loss to growers was \$200m. The impact of the tomato potato psyllid was estimated to have caused some \$50m damage to the potato industry in the 2008/09 season but has also impacted dramatically on some smaller industries such as tamarillos.

So what did I take out of the forum? It is

about risk management. The sheer volumes of people and goods coming into the country are so huge that not every item can be checked. Roger Smith, the ministry's Deputy Director General Verification and Systems, outlined how priorities and strategies are set. In particular there is a focus on containers and working with authorities and importers offshore to reduce the chance of unwanted organisms getting into the country. This approach appears both practical and proactive. It also has to be allied with the latest science and technology and so it was heartening to see the science partnerships between various Crown Research Institutes, government departments such as MPI, the Environmental Protection Authority and the Department of Conservation along with some private groups that are part of the Better Border Biosecurity programme.

There is still uncertainty, however, about how prepared we are and whether or not New Zealand – not just the ministry – is approaching biosecurity in the most effective way. The doubt comes from incidents like those cited above and from more formal assessments, such as in the Parliamentary Commissioner's Report released in 2013.

It's not just about primary industries. We also have to think about our native flora and fauna and the impact of imported organisms on our biodiversity and the environment.

There is the tension generated by the need for trade and tourism for our economic benefit but these processes also generate the risk of importing unwanted organisms. We expect to be able to export our produce but banning material from other countries can be described as a trade barrier.

There is also a level of uneasiness that our biosecurity interests are being compromised in the interests of trade, and that opportunities for new ventures are being prioritised against the risk of destroying what is the basis for our economy now. In 2013 not only did we have questions about biosecurity but also about food quality and safety. Fonterra milk powder was recalled after a scare over the prospect of some product being contaminated with the botulinum toxin, while export meat shipments to China were held up due to delays in documentation. This was reinforced by comments from Trade Minister Tim Groser in October. He

criticised the Ministry for Primary Industries as under-resourced and unable to respond effectively to recent food safety crises.

So how do we improve our biosecurity? At the forum this was not addressed as surely, perhaps, as it might have been. Clearly MPI is using technology and science to develop strategies that best allow it to identify and target risk pathways but recent events indicate that perhaps there are just not enough resources targeted at these roles. Even within private companies, has the desire to be lean and mean gone so far that it is compromising capability in terms of monitoring and assessing risk?

But responsibility for biosecurity cannot rest just with MPI. The Government Industry Agreement would appear to offer a way forward for industry to be involved with risks and solutions. At the moment this particular initiative seems to be operating only with smaller product groups and to be more about how to share costs. Industry involvement with government in terms of risk analysis and industry practices may offer wider benefits and sound long-term decision-making.

So have we gone soft at the border? Maybe not. Maybe we are working smarter. But there are still some hard questions to be asked and the focus may need to be adjusted – not just in what is new or what we might gain but in what we might lose.

Please remember the International Horticultural Congress will be held in Brisbane later this year (17–22 August). The NZIAHS is one of the host organisations for the congress and we are keen not only for it to be a success but for there to be as many New Zealand participants there as possible. I encourage you to get involved, whether as a delegate, part of the commercial exhibition, or as a sponsor. The congress is different from many other science conferences, in terms of size (planning for 2,500–3,000 delegates), the range of countries represented, the involvement of developing nations, and the blend of people who will be at this congress because of the proximity to Asia and the Pacific. You are invited to be part of this great event.

David Lewis
President

by John Lancashire:
Past President, NZIAHS

What is really wrong with Fonterra?

WITH THE AVALANCHE OF articles, reports and interviews resulting from the melamine and botulism “incidents” it would be expected that some light would be thrown on the food safety issues they raised, so that New Zealand would avoid them being repeated in the future. The so called “independent” internal report on the botulism crisis by Fonterra, chaired by an independent member of the cooperative’s board, presented 33 recommendations. Largely these addressed the time it took to pick up the seriousness of the situation and the need to develop a social media strategy and improve communications (which, by inference, meant the company’s public relations).

Action had already been taken on the latter with the appointment of a new communications chief, Kerry Underhill, who said it was too early to say how many new staff he would appoint to the in-house team, “but a high priority is to up our game in social media”.

Perhaps one of his first tasks could be to unravel the unseemly media exposure of the split between Fonterra and AgResearch on who was responsible for the wrong interpretation on the presence/absence of the botulism organism.

The report also criticised the “Fortress Fonterra” philosophy which again highlighted inadequate communication planning and skills. Action on this has been very slow, as the *National Business Review* pointed out when it said “you need a forensic accountant to penetrate Fonterra’s finances”.

A recent report on food safety aspects of the “incidents” has reassured the Minister, Nicola Kay, that we have a world-leading system, which she rather simplistically suggested just needs a few tweaks to deal with some new trading relationships.

We live in hope that the final report from Ministry for Primary Industries will throw more light on what actually went wrong, so that in future such a shambles will not re-occur. Some answers can be found in a recent address by the manufacturing general manager of Synlait Milk, Neil Betteridge. He pointed out that the Fonterra issue does hurt the entire New Zealand food industry. Synlait was a small company and kept a close eye on safety measures taken by its major customers such as Nestlé, which were often the first to notice deviations to food products.

In a series of addresses, Fonterra chief executive, Theo Spierings talked more about sustainability and the environment than the food industry. He was fairly critical of the report from the Parliamentary Commissioner for the Environment, Dr Jan Wright, on “Water Quality in New Zealand”, describing it as “in the past and looking backwards”. But he did admit that Fonterra was 8-10 years behind the

Europeans in tackling these issues.

Despite expecting a 2.5% to 3% growth this year, he further admitted that “we can’t keep growing in this way before hitting a wall in terms of sustainability and the environment”.

Nevertheless, our biggest company, with over 90% of the nation’s milk supply and 25% of our merchandise exports, clearly has a huge role to play in assisting the government in achieving its goal of doubling primary exports by 2025. It was news to many to hear that Fonterra had presented a 10-year growth plan to the government. It would be very interesting to see how that is going to be achieved, given the constraints identified by the chief executive.

It was also revealed at the recent Fonterra annual general meeting that company chiefs believe sustainability in the entire supply chain is the key to further international growth and they had a strategic plan for this.

Although Fonterra seems fairly gung-ho about future growth prospects, there is an increasing opinion from Rabobank and KPMG among others that dairy prices are going to take a hit this year or next, largely as a result of big increases in US production and changes in the EU support mechanisms. New Zealand has also lost its place as the lowest-cost producer of milk in the world. There are a number of reasons for this, including the fact that alternative feeds comprised just 10% of farm expenses 20 years ago but now account for 25%. Interest costs have risen because of the huge debt carried by the dairy sector, probably up to \$35-40b, and the Reserve Bank has flagged substantial increases in interest rates this year.

The real problem with Fonterra, as illustrated by the melamine and botulism scandals, is that it is in the food business but it does not “think” food. This is not surprising as 50% of the directors are farmers and several others have outside interests in farming. The Shareholders Council represents the interests of farmers so it is inevitable that Fonterra is really just a big farmer with an outstanding manufacturing capability tacked on. It therefore comes as a surprise that Fonterra’s CEO claims that their business model is 20 years ahead of the rest of the world. If it was that good, then why haven’t company chiefs recognised that becoming a food company would add value to their emphasis on cheap commodities. It would reduce pressure on the environment too, because there would be less need for more cows to produce more low-value milk. This is not a new idea but maybe its time has come. As Jan Wright puts it, if we carry on increasing cow numbers we may just hold the line on environmental sustainability. Wouldn’t it be nice to have a better target than that? 🐄



BIOSECURITY IN NEW ZEALAND

have we gone soft at the border?

The Minister for Primary Industries says biosecurity is a high priority. Former NZIAHS President John Lancashire, giving biosecurity a 55% pass, says it can do much better. These and other points raised at the Institute's forum last year have been extracted from the presentations for featuring in this issue of AgScience...

Biosecurity probably is more important to New Zealand than any other nation but free-trade agreements and tourism are putting the biosecurity system at risk.

Nathan Guy, the Minister in charge of biosecurity, has rebutted claims of budget cuts and said overall funding has doubled since 2000. He has highlighted 86 new front-line staff being appointed.

But here's how I rate the ministry:

- 1. Recent track record:** Biosecurity has been the subject of a highly critical independent report by Sapere Research on its handling of the Psa-V incursion (probably one of the most critical reports regarding any government department) and an Auditor-General's report saying it is not well prepared for an outbreak of foot-and-mouth disease. The potential cost of an outbreak is \$10-15b. Score 3.
- 2. Precautionary principle:** Restrictions are applied where there is the slightest risk but the ministry regarded the risk as slight that pollen transfer would spread Psa-V. Score 5.
- 3. Coping with Government:** Let's make allowance for the ministry's need to meet the immediate demands of incursions while being constrained by government's lack of long-term planning and their continual restructuring. Score 7.
- 4. Trade pressures:** Biosecurity cannot stand alone. MPI must consider international trade obligations when making a risk assessment and the Government applies tremendous pressure for more free trade agreements. This puts the biosecurity system at risk. It does not justify continual ministry hassling of NZ Pork for six years to allow imports of raw pig meat. The pig industry believes there is a risk of the devastating virus PRRS entering New Zealand. The ministry believes there is a "slight risk". New Zealand must toughen up. The industry has lost its appeal to the Supreme Court and raw pig imports will be allowed. Score 2.
- 5. Tourism pressures:** The Government is keen to further increase tourism and with the Prime Minister serving as Minister of Tourism, it will happen. There is pressure to streamline border controls to make passenger entry more efficient and make trans-Tasman travel "near-domestic". 100% X-rays have been replaced by random checks. Two former biosecurity officers believe border screening shortcuts have increased the chances of pests getting through. Score 4.



6. Comparisons with Australia: Australia seems to take a tougher line on biosecurity. New Zealand apples were barred for 90 years. Australia has no Psa-V, Varroa or PRRS. We are more dependent on primary exports and cannot afford to be soft on biosecurity. Score 7.

7. Are we world class? "World class" is a much over-worked term used by successive Ministers and ministry heads. We do have a good biosecurity system but we have to work a lot smarter. Until we do, a world-class system is aspirational rather than what we have. Score 8.

Final score: 55%.

There is room for improvement.

John Lancashire

Government's viewpoint

A world class biosecurity system is not about how many people are standing guard at our borders. It takes effect across a number of stages from pre-border to at-border to post-border. All facets of the system need to be strong and need to be regularly reviewed for improvements.

The challenge is how we continue to facilitate and grow trade, yet continue to protect New Zealand from unwanted pests. It can't be a choice between these two goals. We have to do both.

Around 175,000 items come across our border each day and we receive around 10 million travellers a year. It is not possible to do an exhaustive search of every item in every container in every consignment that arrives in New Zealand. What MPI does is work smartly to manage risk at every level of the biosecurity system and to provide the best level of protection.



©DRUG DETECTOR DOGS

The total number of staff has decreased since 2008, but the decrease over the past five years has averaged around 1.9% a year and the biggest contributory factor was the global financial crisis, which significantly reduced trade flows. As trade increases again, staff are being bolstered. MPI's biosecurity detector dog programme has also expanded its operational capacity.

MPI is trialling a pioneering X-ray image transfer process with Melbourne Airport that will enable the biosecurity screening of luggage before it arrives here. Any bag containing biosecurity risk items can now be matched with the passenger, who will face further scrutiny by officials upon landing. In the longer term, X-ray image transfer could be applied to routes with higher biosecurity risk, such as those from South East Asia, parts of Europe and the Pacific.

Enhancing our ability to manage outbreaks of significant animal disease, in particular foot-and-mouth disease, remains a high priority. Earlier in 2013 a report by the Auditor-General identified some areas of improvement. MPI has fully accepted the recommendations by the Office of the Auditor-General. Some – such as regular simulations and exercises – had already been implemented.

Hon Nathan Guy, Minister for Primary Industries

The current research and development on how we improve the quality of our border

Indigenous flora, central to our culture and tourism, are subject to invasion by unwanted and destructive exotic organisms. The rate of incursion is likely to continue to increase.

Increasing visitor arrivals are coming via different transport modes from different places. One area of interest is the growing cruise-liner business. Increasing trade movements pose challenges too.

The Biosecurity Strategy for New Zealand in 2003 emphasised the critical role that science plays in underpinning the biosecurity system.

B3 is the premier science vehicle underpinning current practice and for anticipating and informing future challenges and opportunities for plant-based border biosecurity. It aims to be a world-leading provider by 2017 of border biosecurity research, knowledge and tools that will have wide applicability in New Zealand and internationally.

Work mainly is on invertebrates and plant pathogens, not vertebrates. So the focus is on plants, not animals and not necessarily weeds. It works on pre-border, border and post-border. Research themes are risks (what are the pests and diseases of risk to New Zealand?); pathway risk management (what are the high-risk pathways and how are they closed?); diagnostics (can we identify them when they get here?); surveillance (can we improve the tools to identify incursions as early as possible?) and eradication (can we improve the tools to improve our chances of eradication?).

Dr David Teulon, Director, Better Border Biosecurity



What are the lessons learnt by MPI as a result of the recent incursions? Have any changes been made or planned to mitigate against future risks?

In the 2012/13 financial year 5 million passengers and 3.5 million cargo consignments arrived in New Zealand. Biosecurity staff dealt with 650,000 containers, 90,000 vehicles/machinery and 30 million mail items in 2010/11. Volumes are growing due to changing trade and travel patterns.

The ministry is focusing on what matters most, aligning its resources to risk. This involves toughening up on non-compliance and targeting high-risk arrivals. This calls for making better use of data/intelligence to inform risk management. It might result in fewer suspect items being found overall but the things that are found will be what counts.

Among recent initiative is the X-ray image photo transfer trial. An agreement with Melbourne airport gave us a priority to collect the X-ray images that come from security screening there and send it to New Zealand so we can look at baggage X-rays before passengers arrive. The border sector work programme involves the NZ Custom Service, MPI and Immigration more effectively using resources.

The Passenger Process Assurance Group has surveyed around 7,000 airline passengers. A very strong statistical sample telling us what comes through our airports and who are high and low risk to enable us to develop better systems. But nobody, from the best scientist to the best statistician, can tell me what the real risk is. All I know is that the most noise tells me the cargo pathways are high risks. We are doing work on these.

We haven't got staff at 5,500 cargo facilities but we do have 12,000 accredited persons who are meant to be our eyes and ears and we have accredited training providers so these people know what they are looking for and what to do. It's a pragmatic, risk-managed system.

So we are taking a multi-layered approach. We are pushing the border out as far as we can but we also have to have the response and preparedness when things come through and things will come through. That is a fact.

Roger Smith, Ministry for Primary Industries



The wider issues of biosecurity and biodiversity in New Zealand. It's not just about agriculture and horticulture

A recent paper from *Nature* shows that biodiversity losses are burgeoning globally. If we focus on New Zealand, we have suffered major extinctions including 59 species of birds. We know how many plants we have but we don't know how many have gone extinct.

Invasive species are a main driver of loss and in most cases the impacts are increasing. Data collected in bird counts every single year at Mt Misery show communities of more common species like grey warblers, tom tits and bellbirds have undergone massive composition changes because of possums and wasps.

More than half the plant species established in New Zealand are exotic, at least 328 of them environmental weeds.

We are worried about the borders but more than 2,000 invertebrate species are already established in New Zealand and spreading. We know little about the impact they are having, apart from invasive wasps and ants. More species in some groups are arriving all the time, tending to be the more cryptic species that we can't detect.

One of the most controversial proposals to introduce species in recent years has been ERMA's application to import and release eleven species of exotic dung beetles. The ecological considerations weren't taken into account sufficiently and the scientific evidence was inadequate.

Climate change is another factor that should be built into our risk assessments. We know we are in trouble with some invasive species that are here already but many are subtropical/tropical species that are going to thrive much better under climate changes over the next 50 years.

We have had some great successes with pest eradications and increasing public awareness but our biodiversity still declines and new incursions continue. We are still undergoing massive habitat loss, particularly in rare ecosystems around dairy conversion in the drylands.

New tools are needed for detection and control along with greater consideration of conservation issues. In particular we need a better understanding of the value of biodiversity in cost benefit analysis. And we need to abandon the idea around biodiversity and conservation that if we don't have any information it means there is no impact. Lack of information because we don't know about a species in New Zealand or how it will react in New Zealand's ecosystem doesn't mean there will no impact. We just need to get smarter about how we predict things and we need good science to be able to quantify the uncertainty better.

Dr Margaret Stanley, University of Auckland



Threats to the dairy sector

A significant biosecurity incursion adversely impacting on the New Zealand cattle industry and our ability to trade is rated within the dairy industry's top three business risks. We are not just about producing animal products but our feed source is critically important too and we take an active interest in things like the great white cabbage butterfly which has the potential to impact on brassica crops.

Pre-border standards need to be technically robust and internationally defensible if we are to continue to trade from an export industry perspective. They have to be adequate in a rapidly changing product-trading environment where surveillance standards and levels of reporting in some countries of origin may be low. We also have to recognise that we have got increased cargo and passenger traffic from countries where the status of biosecurity threats is different from ours for many diseases with implications of economic importance.

We import a lot of feed, such as PKE, copra, tapioca, cotton seed. We need to think about the drivers around this – compliance versus profit. We can have expectations that we are going to get good compliance but dollars may drive contrary behaviours.

One of the things that has taxed my mind is the ability to import live cattle from Australia. Why would you do this when you can import embryos and semen with a significantly less biosecurity risk?

Our current disease status confers significant productivity benefits, but many exotic diseases have the potential to significantly erode these and reduce our competitive advantage. As a consequence the cattle and other animal industries are likely to be more risk averse than the regulator. Industries have the right to fiercely contest the import of products they consider to pose a risk. The Ministry for Primary Industries needs to consider this and make a balanced judgement.

Dr Lindsay Burton, Fonterra



Threats to the horticultural industry

New Zealand's horticulture (including wine) is a \$6.6b industry, It generates \$3.6b export earnings, or 8% of total merchandise exports. Horticulturalists grow on 120,000ha (about 0.4% of New Zealand's land area) and employ 50,000 people. Counter-seasonal fresh fruit and vegetable sales to the northern hemisphere are a key driver. Our customers and buyers internationally trust our food safety systems and know we are reliable and act with integrity.

During my 20 years in the industry we have seen several pest incursions. The impacts and responses have varied but these pests are all well established in New Zealand now. They include Western Flower Thrip 1992; Guava Moth 1997; Lettuce Aphid 2002; Tomato Potato Psyllid 2006; Iris Yellow Spot Virus 2008; Varroa Mite 2000; Psa 2010; Hadda Beetle 2010; Great White Cabbage Butterfly 2010; and Liberibacter 2007 (new to science). The impacts of the Tomato Potato Psyllid and the associated Liberibacter on the tomato and potato industries and Psa on the kiwifruit industry, have been significant.

The industry's strategy called "growing a new future" aims to create a \$10b industry by 2020. The key premise is that we must move away from commodities and target markets and consumers in premium markets. The strategy is not about feeding the world. It is about growing value rather than volume.

Biosecurity incursions set us back and are contrary to what we are trying to achieve. Controlling new pests often involves growers using chemicals that are older and harsher and require more frequent spraying; it increases labour costs and erodes our competitiveness. Moreover, incursions can have a significant impact on marketable yields. This affects the industry's profitability and when a sector is fighting for survival, investment is diverted from creating value to protecting value.

The real threat to horticulture therefore is that biosecurity incursions will prevent us from making the changes and achieving the market focus required for us to become a \$10b industry by 2020. But I want to emphasise the opportunities. The countries and suppliers we compete with face the same challenges and biosecurity threats that we do, and New Zealand's isolation gives us a unique opportunity to manage this critical issue better than our rivals. But we need to build a stronger partnership between industry, government and science to do that.

Peter Silcock, Chief Executive of Horticulture New Zealand

Threats to the kiwifruit industry

Before November 2010 kiwifruit export revenues had been growing at a 9.8% compound rate annually over a ten year period and Zespri Gold kiwifruit was earning \$400m a year. Psa, a bacteria that infects kiwifruit vines, was then found in New Zealand. The likely financial losses are estimated at \$800-900m over the 15 year period from the time of the discovery, not counting the loss in equity values and other losses throughout our supply chain.

A concerted effort was made immediately to contain Psa but after three months of hard work it became obvious that containment and eradication was not possible and we would have to live with it, for better or worse. Spring is the most important period every year and is approached with anxiety and trepidation. So long as growers are following best practice, they can get themselves through. We have also introduced a National Pest Management Plan giving leadership of the on-the-ground response to Kiwifruit Vine Health.

During the past few years the removal of Gold kiwifruit has been substantial, replaced with a more tolerant (but not resistant) Gold variety. Successful growing in the presence of Psa will require good orchard management in combination with good cultivars and use of management tools that are available. We will get through this.

The big lessons learned from the Psa experience include the importance of leadership, the need to acknowledge the different stages of impact on growers, the importance of information and communication, and that everybody has a need for something different. Information must be made available quickly and readily and when it is not, somebody needs to make leadership decisions. There is always a need for clear direction, even in the absence of information.

Industry has to take ownership of biosecurity issues. In our industry we have given a mandate to Kiwifruit Vine Health to provide leadership but we need active engagement with government to raise the biosecurity profile. We need investment in R&D and we need to keep up with developments offshore. And others need to learn from us about the pain inflicted by Psa.

One final thought: don't decry the importance of biosecurity. It's not what you can afford to spend, but what you stand to lose.

Dr David Tanner, General Manager Science & Innovation, Zespri

Powerpoint presentations for all speakers at our Biosecurity Forum can be found on our website www.agscience.org.nz



PSYLLID, VARROA MITE & PSA IMAGES
COURTESY OF PLANT & FOOD RESEARCH

GET OFF THE GRASS

Get Off the Grass, by Dr Shaun Hendry and the late Sir Paul Callaghan, is a follow-up to the 2009 Book *Wool to Weta*, by Sir Paul, which outlined a plan to transform the New Zealand economy through high-tech manufacturing and a knowledge economy through intellectual property (or IP) patents. As a non-economist, I found the discussion on the history of economic theory and ideas and their application through iconic figures such as Adam Smith and David Ricardo absolutely fascinating. But the sub-title of the book is to find the magic bullet to kick-start New Zealand's innovation economy. The implication from the book's brilliant title, moreover, is that we must reduce our dependence on the poorly performing and largely grass-based primary sector.



But the book does not start well. The cover is illustrated by stylised grasses including bromus species and fescue, which are not widely used in New Zealand farming. There is no sign of ryegrass and white clover, which are the basis of our modern grassland technology. Most farmers would be pleased to get off the grass if their pastures were dominated by the species shown.

The discussion on patents is highly misleading too, in attributing very low numbers to the land-based industries. The authors seem unaware of the Plant Variety Rights legislation of 1987 which is a type of intellectual property right that protects new plant varieties in this country and is standard practice internationally. Hundreds of new grassland plants, arable crops, horticultural plants, forestry trees and garden plants have been protected by this legislation in New Zealand over the past 25 years.

The book then goes on to illustrate how some companies and countries have used the economic principles outlined to be successful. The importance of larger communities and cities in generating innovation and patents through improved critical mass and "connectivity" is illustrated by examples such as Detroit. This is not a good example. Detroit is now eligible for the biggest municipal bankruptcy in US history because the city is broke and negotiations with the thousands of creditors is unfeasible according to a federal judge.

Finland has been used for several years as a model for the way New Zealand should develop. It is a small country highly dependent on primary production – largely forestry – that has been very successful in diversifying its economy into hi-tech areas. The mobile phone company Nokia is the model used in the book, because of its emphasis on "connecting people", growing patents (up 2,000% in two decades) and increased government investment in research and post-graduate education. But Nokia has recently run into serious problems and its shares dropped from \$40 to \$2 in value and have been described by some financial agencies as "junk" because the company has not kept up with the latest technology.

Examples of successful New Zealand companies that follow the author's model include Tait Electronics, Fisher & Paykel and Callaghers. But they also include Rakon, which has been in financial strife.

Overall the case for a major shift in direction to kickstart the New Zealand innovation economy is not proven. In particular, the request for a major increase in government funding reduces the credibility of their argument. The New Zealand government spend on R&D is about the average for OECD. The big lack in New Zealand is the very low private-sector spend on research which is about one third of the OECD average. The book does not tackle this or the more difficult issue of how to improve returns from the poor-performing primary sector. So the vain search for a magic bullet for the New Zealand economy will continue. ☹️

GET OFF THE GRASS: Kickstarting New Zealand's Innovation Economy, by Shaun Hendy and Paul Callaghan (AUP, \$34.99)

New members We welcome

Bob Fullerton (Auckland)
Champak Mehta (Auckland)
Bridie Carr (Hawkes Bay)
Tim Herman (Hawkes Bay)
Brent Clothier (Manawatu)
Peter Buchanan (Manawatu)
Azadeh Esfandiari (Manawatu)
Mareike Knaebel (Manawatu)
Mo Li (Manawatu)
Isabel Tait (Manawatu)
Yugo Wang (Manawatu)
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Juliano Salgado de Oliveira (Canterbury)
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