

NZIAHS Forum
“Where do we want our dairy industry to be in 20 years time?”
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Technology transfer can not be left to chance

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"To kill an error is as good a service as, and sometimes better than, the establishing of a new truth or fact" - Charles Darwin.

The only reference points we have to help us look 20 years into the future are history, the situation today, and what we would want for the future.

The past tells us that the dairy industry has made huge progress, especially over the past 50-60 years (Holmes 2007) and it is reasonable to suggest that this progress is built on sound science from many disciplines: animal and plant genetics, pasture and soil management and the control of pests and diseases. From this it can be inferred that the goal of an economically sound and environmentally sustainable dairy industry in 20 years can only be built on the shoulders of sound, robust science. But this is not all, because another lesson from our recent history is echoed in McMeekan's famous dictum: science is of no use unless it is applied on the farm. To achieve this requires technology transfer.

I am focusing in this paper on this junction between science and the farmer. Are we headed in the right direction in terms of the institutional values and ethics required to undertake the necessary research and the integrity to translate that science into information that farmers can understand and trust?

Some reflections from history

McMeekan's dictum does not mean that all agricultural scientists must work at the applied end of the spectrum. All types of science, from pure to strategic to applied, are required to solve the problems ahead. I take McMeekan's imperative to mean we must have scientists capable of synthesising across these artificial boundaries to faithfully bring to the farmer the collective meaning of the science in an understandable manner.

I fear that this type of scientist is becoming a rare breed in agriculture for the simple reason that, apart from DairyNZ, through their Consulting Officer Service, and Meat and Wool, via their Monitor Farm Programme, technology transfer nowadays is nobody's responsibility. Even worse, what is now called technology transfer in an age of 'commercialisation' is little more than institutional propaganda designed for marketing reasons. The crunchy useful

'take-home' message has evaporated in the heat of cash-flow. The current joint DairyNZ/AgResearch/MaF road-show on climate change is an example.

Science – purpose

Prior to the CRI reforms the purpose of publicly funded agricultural research was brutally clear – it was for the public good. No accountants or MBA's need apply! Under the CRI Act the purpose of the CRIs is two-fold; to undertake research for the public good **and** make a financial return to the shareholder which is expressed either as a return on assets, a dividend, or via tax. But commercialising and politicising science undermines the integrity of science by bringing to it motives that contradict its purpose.

The recent CRI review wrestled with this. Its report shows they did consider the idea of making the CRIs “not for profit” organisations. They rejected this, arguing that a change would be disruptive given that so much time and effort had been invested in the current model. Their solution was to better define the purpose of the CRI's, but if we do not know that now after 20 years of effort we will never know! It is my view that while the Act remains the CRI will continue to be two-headed monsters not confident to look in any direction.

Technology transfer

There was a time when New Zealand had one of the best agricultural technology systems in the world. It was much admired by overseas visitors. It began with Farm Improvement Clubs and developed into the Department of Agriculture Extension Services and then, ultimately, to the Ministry of Agriculture Advisory Services. At its peak, farmers depended on it as the arbiter of good and bad science and information. In the interests of improving the economic efficiency of the nation this system was stupidly dismantled to the cry of user-pays.

What has emerged from the ashes is a disparate group of aging consultants whose focus, it appears to me, is more on the management of farmers resources rather than transferring emerging science and technology onto the farm. For example, it is becoming obligatory for dairy farmers to have nutrient management plans but the technical skills to roll this out across the nation are meager.

Fourth Estate

Having a science-literate agricultural press, free from commercial constraints, to convey the necessary science to the farmer is also vital. Once again our own history suggests how this should be done. The Department of Agriculture's *Journal of Agriculture* was widely read and treasured by farmers for many decades as a source of hard data and commentary from science. So too was the *Dairy Exporter*. What they published could be trusted and relied

upon. Today the agricultural press relies largely on advertising revenue. Hence the stories they carry are often a reflection of the advertisers than of science.

Some symptoms

So what are the consequences of commercialising and politicising agricultural science and how does this impact on the integrity of the science message delivered to farmers?

Example 1. The Press

An agriculture magazine that is widely read and purports to be a quality publication told its readers a new fertiliser product on the market enhances soil quality through “electromagnetism”. The same issue carried a story celebrating homeopathy. Scientific evidence refutes both.

How can this be at a time when the national catch cry is “science is the driver of the economy”? From the age of enlightenment, we have emerged into the philosophy of post-modernism which sets aside evidence as the authority and asserts that the ‘truth’ is what you believe – if you believe it, then it is your ‘truth’. Importantly all opinions are to be given equal authority, irrespective of where evidence may lie. These ideas have progressed to what is now called ‘post normal science’. This holds that science is subservient to the story that must be told. The role of science is no longer about discovering new ‘truth’ but supporting the ‘story’ which is perceived to be the truth. This gives rise to the notion of “noble-cause science”, which allows scientists to ignore contrary evidence, or worse, manipulate the evidence, if the cause is noble. We have seen evidence of this in the climate change debate.

Mix together an agricultural press dependent on advertising revenue with this ‘anything is true’ post-modernistic nonsense and you have a recipe for a technology transfer disaster. But the ‘market model’ theorists will argue that this philosophical environment should motivate farmers to become savvier – better educated – so they can winnow the wheat from the chaff. But will this be sufficient? What happens when the scientist becomes the salesman?

Example 2: The CRIs

A predictable consequence of the CRI Act is that scientists have become salesmen. CRI staff are now seen fronting advertising campaigns for products from which the CRI derives royalties. In one case it is known the CRI had data that did not exactly support some of the claims being made for the product. This highlights the clash between the public good (in this case the farmer) and the private good (the dollars). However well-educated, the farmer’s confusion is palpable: is the scientist acting as a scientist (public good) or as a salesman (private good).

A further justification for the CRI reforms – we were told – was to get politics out of science. Sadly the effect has been the opposite. Most of the funding

decisions are now made in Wellington and it seems unlikely significant funding could be won for a project that did not fit the political agenda. Indeed one of the skills in preparing a FoRST bid is to double-guess the political agenda. Consider for example, how many projects are being funded to investigate the possible mechanisms that govern global temperatures, other than greenhouse gases, such as the sun-spot cycle or the Southern Oscillation?

This politicisation of science also has the potential to compromise the purpose and integrity of science, as the next example highlights. 'Climate Change' is undoubtedly one of the most important issues confronting society, especially agriculture. We now know that the government policy (the ETS) to mitigate increasing greenhouse gas emissions is going to cost agriculture millions of dollars. I am sure no-one would object to this if it was being done for sound, objective reasons. But that is the question; how sound is the science?

The official NIWA website records the average New Zealand temperature (*Figure 1*) and shows the average New Zealand temperature has increased since about 1900. The New Zealand Climate Science Coalition has quite legitimately obtained the raw data (*Figure 2*) and contends they show no warming. These data are derived from seven long-term climate stations and there are legitimate reasons for making adjustments to the record to accommodate changes around, or shifts in, their location. However, after exhaustive enquiries through layers of political obfuscation from the Government and NIWA, it appears that the evidential basis for these changes does not exist.

Importantly, the issue here is not climate change: it is the conduct of science. The checks and balances essential for the science process to operate require that science, and in particular publicly-funded science, must be open to scrutiny.

Example 3: Universities

The universities, once regarded as the bastions of independent free thought and debate in society, have also been engulfed by the clouds of commercialisation and politicisation. I could choose many examples but one will suffice.

A New Zealand fertiliser company is marketing a product 'developed' at a university, with funding from the fertiliser company. The patent is in the name of both parties who receive, one assumes royalties from this arrangement. The product is an aqueous solution of a common chemical (DCD) first discovered in the 1950s. DCD slows the conversion of ammonium to nitrate in the soil and much research has been completed in the intervening years and particularly in the Northern Hemisphere, to investigate its potential to reduce nitrate leaching and emissions a nitrogen gases for fertiliser and soils. These issues obviously are relevant to New Zealand, but how robust are the various claims made about the product? Has it been both independently and extensively tested in all farming situations?

I think the only solution is that scientists when writing and commenting about products and services are made to declare all their private interests so that the public can make its own assessment as to what weight, if any, should be placed in any opinion and conclusions which are offered.

Example 4: Conferences

Conferences are an important component of the technology transfer system. It is now standard practice for the costs of these conferences to be met by attracting commercial sponsors. In itself that is of no great concern. However problems arise when sponsors are given speaking rights at the conference they have sponsored, or worse, they use their financial leverage to dictate how the conference is managed.

Two examples:

One of the sponsors of a New Zealand conference where the owner of the company had speaking rights which he exercised by telling the conference of his achievements selling his product. At the beginning of question time the chairman reminded us that science must be tolerant of other views, thus closing down any sensible questioning.

The second was when I co-authored a workshop at a conference on the topic; Fact or fallacies: who is telling the truth and how to tell the difference? The sad consequence was that I received a letter from the organisers banning me for life from future events for criticising one of the sponsor's products. The question arises as to what is the purpose of these conferences – to inform farmers or to protect the interests of the sponsors?

Conclusions and suggestions

We all want a sustainable New Zealand dairy industry. This can only be achieved by sound, public good science uncompromised by other motives, and a system to translate that science into farming practice, free from commercial considerations. But the frequent comment I hear from farmers throughout New Zealand is that they are confused in respect to scientific and technical information. They do not know who to believe or trust! This is a measure of current state of technology transfer in New Zealand – it is broken. What to do?

First, agricultural science must be returned to its normative roots. The CRIs must be made not-for-profit organisations, bulk-funded and managed by those who are scientifically literate for the public good. This is the only way to maximise the time scientists spend doing science, minimise science transaction costs and maximise allocative efficiency. Science has always been a contest of ideas chasing research money and to overlay this with a further artificial layer of 'competition' and 'accountability' is demeaning and counter productive (*Edmeades 2004, 2006, Rowarth and Goldson 2009*). But most importantly the integrity and purpose of science would be restored. Whatever technology science produces can then, in the interest of the public

good, be 'given' to the private sector to develop and deliver to the farmer, as only the private sector can.

The need for technology transfer must be officially recognised and funded. To leave it to chance is not an option.

Figure 1. Adjusted average NZ temperatures from 1860 to 2000 as reported by NIWA. (<http://www.niwa.co.nz/our-science/climate/news/all/nz-temp-record>)

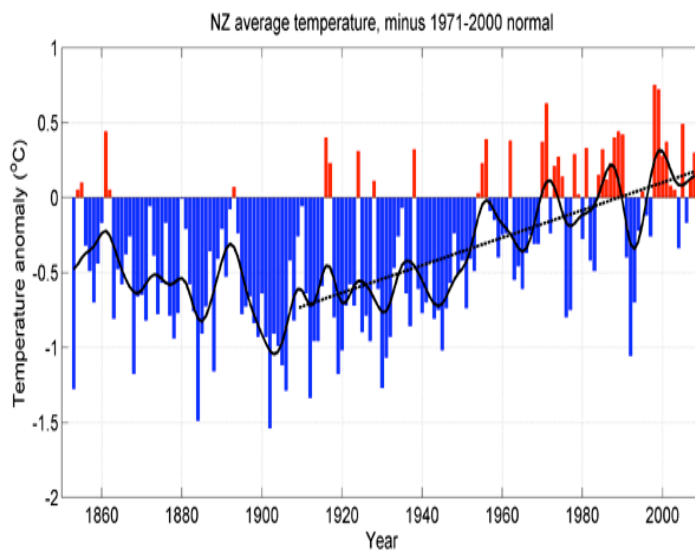


Figure 2. Actual average NZ temperatures from 1860 to 2000 from NIWA data (<http://www.climateconversation.wordshine.co.nz/docs/awfw/are-we-feeling-warmer-yet.htm>).

