

Reflections on the past and links to the future

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My presidential address is not going to follow the traditional format of the last decade or so where the president reflects on where in the world New Zealand agriculture sits, or how we can transform New Zealand agriculture. Rather I am going to reflect upon my own research career which spans 50 years of mainly field studies and how I see some of the early research being relevant even in today's very different environment.

When I look back and reflect on my 50 years as a researcher, both field technician and scientist, one thing stands out. The first 25 years was mainly spent researching production increases via increased and more efficient fertiliser usage. The second 25 years were spent investigating and mitigating the environmental impacts of this increased production. In doing this I can see several themes that have re-occurred, some for the better and some not. There have been incidences of research appearing to repeat some 20 + years after the first study. I will give an example of this and why I feel that in the right situation this is not always a bad idea. I have also been involved with farmers doing on farm research as well as working on research stations. Both have their place.

Anders Crofoot, in his presidential address in 2010, highlighted one aspect of on farm research - '*seeing is believing*'. This reminded me of the late Bill Kain, who, after one field day at the then Takapau Research Station had a debrief in the Waipukurau pub. In this he took great pains to explain some of his thinking to us young new researchers on how to react with, and get farmers, on board. He believed the most effective method was getting one farmer in a district to adopt a new technology. All his neighbours would watch with interest and if it was successful, then, half the job was done already. Sometimes this may also occur by accident.

In the late 1970's farmers were developing marginal land by means of Land Development Encouragement Loans (LDEL). There was great discussion about whether this should be done by over-sowing and increased fertiliser, or, over-sowing and increased subdivision. As part of this we set up a trial looking at timing and frequency of fertiliser application at the north end of the Blue Mountains in West Otago. This was a simple trial where we measured the growth seasonally before the farmer put a mob of ewes in for 24-48 hours to graze it off. In year 2 of a 3-year trial we dutifully

measured the yield in early October and the farmer bought along the mob of ewes for us. This occurred on a Thursday, and it was agreed that the sheep would be removed from the trial on the Saturday morning. It happened that the farmer was away for the weekend, and No 1 son was left with the task of removing the sheep. The son partied rather hard on the Friday night and forgot about our trial, so dad dutifully arrived home late Sunday to find the sheep were still on the trial area. Subsequently we got a ring Monday morning to say the trial area had been heavily overgrazed and what did we want to do about it. We decided on doing nothing and waited to see what happened after this. At the next visit in January the site was green and producing more pasture than ever. The farmer was happy and the MAF farm advisors of the time thought that this was a good example of development by subdivision. The farmer even commented that looking at the results he would be better spending money on fencing instead of fertiliser. Remember this was in the days of the LDEL loans so farmers in the area were busy for a few years after this subdividing all their paddocks. Flying over the site some 20 - 30 years later courtesy of Air New Zealand I could still pick out the greener rectangle on the hill face.

I attended my first NZGA conference at the Hasting's racecourse in 1975. I was mainly interested in the presentation of some of Bill Kain's grass grub work as at the time I was a field technician at the Takapau research station which did a considerable amount of grass grub research for Bill. I did however attend one session where a paper was presented touching on wintering of stock, its cost, and the value of grass in wintering. This intrigued me for two reasons:

(1) It was presented by a farmer, which being new to the organisation I found novel, and

(2) Some of his concluding comments struck me at the time as being innovative but which on thinking now some modern farmers may have issue with while others still consider them noteworthy.

Some of these conclusions were:

1. Increasing stocking rate does not necessarily increase net income since it has a sizeable effect on supplementary feed costs.
2. A farming system that does away with supplementary feeding is likely to become more profitable.

3. The cost of supplementary feed of any kind, whether it is hay, barley, fodder crops, or nitrogen-boosted grass, is extremely high and any manipulation of feeding systems and buying and selling policies that fits feed demand to the feed supplied by grass must have a profound effect on net in-come. (Spiers 1975).

Now I feel these conclusions still hold true today. Increasing stocking rate is not now an option for many farmers faced with having to reduce GHG emissions or possibly face the cost of their emissions. Better to increase the per animal production and perhaps lower stocking rate, with possible minimal change to net incomes. The cost of supplements has not dropped, and the type of supplement has become more important in today's farming. There is ample evidence that the type of supplement can influence the environmental footprint of a farm, particularly dairy farms.

The second conference I attended was in 1978 at Invercargill. Here a similar theme of matching feed demand with feed supply came up with several papers (Hook 1978; McDonald 1978; Cooney and Thompson 1978). These papers made me naively think at the time that perhaps we knew all that is needed to know about that for Southland. Then came the dairy expansion in Southland in the 1990's and 2000's. To match feed supply with feed demand on most dairy farm meant that farmers had to use supplements, usually imported, and nitrogen so we had to start looking at it all again. Some of this newer research on improving productivity was presented at conferences during the late 1990's and early 2000's. That period also saw the first papers on the environmental impacts of intensification, particularly in the dairy industry.

However, despite all the new research that has been published over the last 50 years I have noticed several things which make me think these early papers still very relevant.

In the early 2000's we were working with farmers in the Bog Burn catchment in Southland to match their management with water quality, identify issues and suggest management changes. This was a major project covering multiple catchments throughout NZ. Among the farmers I surveyed regularly was one older gentleman who was semi-retired with sharemilkers on his farm. In this case we interviewed both the farmer and the sharemilker. About year 3 or 4 into the programme there was a change of sharemilker. The first time I met these new sharemilkers they were concerned that they would not meet the production targets as the owner was not in favour of the use of fertiliser N. His policy was that excess N fertiliser use was an excuse for poor pasture management. He taught his share milkers to make better use of the pastures and to therefore to remove their reliance on N. In my discussion with both

him and his sharemilkers, there were several during the study, they all went from a bit dubious and struggling in their first year to fully supporting the concept by year 3. The reason for this turnaround was always the bottom line - they were making more money; their bank manager was telling them that they were improving their financial position quicker.

This links back to that first paper at Hastings - increasing SR was not in their best interest. Managing what they had to the utmost gave them a better financial gain plus made them feel better. When that data collected was analysed, modelled and presented at this conference in 2004 such low input farms had the lowest stocking rate of the dairy farmers in the catchment, a slightly higher per animal performance but still had a lower overall production and hence marginally lower EBIT. However, their environmental performance was the best in the catchment having up to 60% lower N leaching and 36% lower GHG losses than the higher input farms within the catchment (Monaghan et al. 2004). This farmer knew the science, knew the research but also had the experience to modify or ignore it to meet his own requirements. In doing so he ensured his environmental footprint was as low as possible. My interactions with him and some of the other farmers in the catchment also made me realise that as a researcher I don't know everything but need to listen very carefully to what farmers say and observe them in their own environment.

I will now touch on an example where research is being repeated but for a different reason. All grass wintering became more common in the 1960's and 70's when electric fences and netting became more efficient, farmers learnt how use mob stocking and rotation grazing to overcome the winter feed shortfalls, and land development via the use of crops such as swedes was slowing down. Several papers presented at this conference in Invercargill in 1978 explained in detail some of these winter management practises. (Cooney and Thompson 1978; Hook 1978) This led to a move away from winter crops, in particular swedes, to all grass wintering on many Southland sheep farms. With a threefold increase in the numbers of dairy cows between 1993 and 1999 (Newson 2000), coupled with a 50% increase in beef animals, wintering of all these animals became a problem. There was not enough land to winter all the cows on grass, so more intensive wintering was required, hence wintering on crops became the norm once again. The environmental impacts of wintering cattle on crops are well known both in the science literature and the popular press (Beukes et al. 2011). This coupled with the need for improved animal welfare outcomes with wintering dairy cows (Neave et al. 2022) has led to a revived interest in all grass wintering, this time of dairy cows. Are we re-inventing

the wheel. No! We are researching the same system for a completely different reason.

Researchers in the past, myself included were conducting research to increase productivity, we now need to temper this with research into environmental impacts, animal welfare and public perceptions while maintaining our place in leading the world in the production of sustainable food. In doing so we need to maintain our links to research done in the past, learn from it and have the courage to repeat it if necessary.

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