



Nuffield Farming Scholarships Trust

A Yorkshire Agricultural Society Award

Pastoral Dairy Farming

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July 2011

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1. Introduction

I am a tight Yorkshire dairy farmer called Malcolm Edward Fewster, known by either Christian name.

I milk about 100 cows on a similar acreage in partnership with my wife Cheryl and my parents, Malcolm and Trees. I have three children, Millie, Renton and Trevor. Our nearest town is Cleckheaton, slap bang in the heart of the conurbation of West Yorkshire.

The emphasis of production has always been on efficient utilisation of forage rather than a drive for yield. Our ring-fenced milking platform is made up of medium term leys, mostly incorporating high sugar diploids and a bit of clover – we'd like more of the latter. About an eighth of this land will be drilled with kale each year. Outlying land is mostly rented short term and is left as permanent pasture. There has been a shift from a traditional all year round system that stemmed back to the days of unpasteurised bottling to a Spring calving New Zealand system which has been ticking away quite nicely for about ten or twelve years. During this period we have used LIC genetics to develop a herd of NZ Friesians with some Jersey cross breeding. This system had great appeal as it required a low capital input and, as proud new owners of a mortgage, financial stability was essential. Recent investments have needed to show a low risk, good return. This includes a borehole and a wind turbine



that should pay for themselves within 3 and 6 years respectively thus contributing to the long term efficiency of the farm.

My dalesman father is a first generation farmer and my Dutch mother seemed to take to the frugal lifestyle required when raising myself and my three sisters. So the opening adjective of 'tight' is perhaps too self deprecating but is a quality that has been instilled in me and which has possibly been the main influence on my business decisions and the ethos that has steered us through various dairying doldrums.



2. The background to my Scholarship plans

Looking back it is difficult to believe that, two years ago, I had real reservations as to whether or not I wanted to apply at all for a Nuffield Scholarship.

In the past I've had many conversations with my wife and parents toying with the ideas of expansion, diversification or taking on another tenancy but generally concluding that our relatively small holding is providing an enjoyable lifestyle with sufficient profit. Significant expansion might involve renting substantial blocks of land away from home to complement our milking platform and would mean major investments plus it would actually detract us from our rewarding low cost formula. There is little potential in this urban area for significantly increasing the ring fenced portion of the farm. Diversification could be an option in the future, though obviously having some inherent risks within itself, but also potentially reducing focus on original core business. I was also wary of promoting myself into something I didn't want to be. Relocation or taking on another unit seemed too much upheaval if not necessary. In any event, should circumstances change we could use our urban farm land as leverage for progress in the future.

So I was in my comfort zone and felt fine with the status quo. Would doing a Nuffield Scholarship sow the seeds of discontent?

However, in 2009 I was encouraged by Tom Rawson NSch (he rightly insists on the letters being used) to join him at the Scholars' Conference in Chester. This was the trigger event for my Nuffield application. It was welcoming, inclusive and thought provoking. One particular Scholar was presenting ideas to start up an intensive corporate dairy farm in this country and at the time I felt a bit intimidated at the prospect of such super dairies becoming dominant in the industry. This prompted me to apply for a Scholarship to look at ways of supporting the presence of grass based family farms such as mine. This was particularly relevant at the time as there was a lot of rhetoric from some quarters of the industry denouncing spring block calving and its influence on market price. A defensive title 'The Promotional Attributes of Pastoral Dairy Farming' was my initial idea, though 'Pastoral Dairy Farming' as suggested by the Nuffield Director John Stones allowed for a broader overview.

I have been accused of being evangelical about grass based dairy farming, a slight exaggeration maybe, though it is amusing to note that the word pastoral has both grazing and clerical connotations!



3. Successful grass based dairying around the world

Most of the farmers I met have been broad minded and progressive, particularly those whom I had been recommended to visit. In this chapter I will introduce at least one farm from each of the countries I have travelled in. Most of these farms relied heavily on grazed grass.

3a. England

Nuffield Dairy Group Trip. 2010. Nathan Pryor

Nathan milks approximately 340 cows, once a day, in Devon. This was one of the farms I visited with the Nuffield Dairy Group's annual study tour and he was very well prepared with figures that showed his business performance. We turned up in force, armed with cameras and clipboards. Nathan got wind of us and wandered over. His pre-school son was on his shoulders, trying to pull his dad's 'tea cosy' hat down over his eyes. I figured Nathan to be the casual staff until he was introduced, whereupon he invited as much criticism and questioning as possible. It soon became apparent that this relaxed man had a keen focus on his business.

Walking around the farm I was particularly intrigued by his ideas of minimising reseeds, stating that in a well managed system the benefit of reseeding can only be seen in the first two years and it therefore did not justify the cost, and that long term fertility is enhanced with permanent pasture. This stacks up. A massive amount of carbon is lost

into the atmosphere from grazed land when it is cultivated. The question of whether sequestration can continue indefinitely on permanent pasture has not been universally agreed on. Since this visit I have spoken to Welsh dairy farmer extraordinaire and fellow Nuffield Scholar Rhys Williams and he claims to have *"improved a sward's grass content from 30% perennial ryegrass to 90% principally by applying a rotational grazing regime"* (or words to that effect).

Whilst we are on the subject of carbon, I surmise that although in some respects Nathan runs a tremendously efficient system, and even though his cows are achieving a heady seven lactations on average, his carbon footprint will not be as low as some higher yielding grazing systems due to the relatively high proportion of the diet that goes into the maintenance of the cow. Having said that, I dare say it surpasses the industry average. Increasing carbon footprint could also be a criticism of the Moorepark analysis that promotes a high stocking rate for pushing profits, though again, optimising grass utilisation will limit this impact. Anyway, please refer to Chapter 6 of this report - Sustainability.

Nathan was an active member of a discussion group which helped keep him on the ball but allowing decisions to be made with regards to other priorities. If I remember rightly Nathan went on to do some junior rugby coaching after meeting with us. He is working on a property near the coast, somewhere to spend spare time with his growing family.



3b. Ireland

British Grassland Society President's Trip. 2010. Moorepark.

The Teagasc dairy production research centre was the highlight of this trip to Ireland. (Teagasc is the Irish Agriculture and Food Development Authority and its main dairy research facility is at Moorepark in County Cork). This was an opportunity to see true analysis of optimal grazing systems.

The farms at Moorepark were well managed and their techniques emulated by thousands of Irish farmers. The facility is truly a beacon of the Irish dairy industry. It offers research based advice on all aspects of grassland dairying, especially grassland management and genetics. I was particularly interested in the data that showed the advantages of cross breeding. For example, a Holstein x Jersey has significantly better fertility traits than either pure breed. The data on the quite widespread use of Scandinavian Reds in Ireland to improve udder health was also particularly interesting, especially as the subsequent cross still had excellent performance at grass.

Irish dairying has many similarities to New Zealand dairying, in that the majority of the milk is for export and milk is produced seasonally on spring calving farms. Therefore Moorepark satisfies the needs of the majority of farmers in Ireland, unlike English research that is serving a more diverse dairy industry. Open days attract several hundred farmers.

I refer to 'Irish Milk Production Systems – in review', a presentation given to us by Brendan Horan, Moorepark 2010, the objective of which is:

A) to identify systems of milk production that give the greatest probability of

sustainable profitability to Irish dairy farmers in the future.

B) to maximise profit per grazing hectare (per kg of home grown feed) within more flexible and sustainable pasture-based dairy systems.

- Generate a cow that is more healthy and more profitable
- Develop grazing practices that grow more and higher quality grass
- Utilise all nutrients more efficiently
- Create systems that convert more grass to milk solids.

It would be hardly possible to compile a more relevant paper.

The general conclusion of Moorepark's trials tended to show that a high stocking rate and low concentrate use provided most profit/ha. Per ha profit is the most useful measure in Ireland where farm size and the opportunity for expansion are limited, particularly in the light of high land prices and limited borrowing ability due to the banking crisis.

The biggest surprise to me was that clover was not exploited on the Moorepark dairying blueprint. It was not even sown in the trial work. Why?

The answer to this is that the No. 1 criterion for a sward in Ireland is early season growth, to reduce risks of shortage in the first weeks of the calving season. Clover growth starts about 3 degrees later than the average ryegrass and therefore cannot contribute to this period. The use of nitrogen fertiliser is also a hindrance to clover development, but used throughout the damp Irish grazing season it allows for over 12 tonnes DM/ha to be grown.



3c. U.S.A.

Nuffield Scholars Conference 2010. Sam and Susie Riehl.

On this brilliant trip to Washington and Pennsylvania we were treated to a visit to two very different dairy farms. One was to Sam and Susie Riehl's business, the other was to Mason Dixon Farms, a large family farm that has shown true innovation with inspirational ideas ahead of its time.

However, Mason Dixon also represents the problems that can arise with intensive housed dairying. Will there be a long term market for this method of milk production, and is the business resilient enough, considering that they are looking to milk all their 2300 cows in small robotic units? I fear that they are losing some of the benefits of economies of scale with this investment. Also, most of the 30 or so people employed on this farm are extended family. What's that all about? I sometimes find it quite difficult to work alongside my old man even though we generally sing from the same hymn sheet! I quote Australian Max Jelbart in his observations, *'It's the two to three hundred cow herds that make the highest margins, the farms with a focused man and wife that are in control of their own future, adopting a simple grazing system'*. (Max now milks over 1000 cows.)

Sam and Susie Riehl operate an Amish family-owned dairy farm in the heart of the Pennsylvania Dutch Country in Lancaster County. They farm 35 Holsteins on 36 acres with very limited use of modern technology.

The secret of success in Amish dairying is perhaps not the relatively low costs involved - Irish and NZ costs would be lower again - in

fact there looked to be a lot of scope to increase the grazed element of the diet. Success may not be due to the excellent levels of husbandry, persistence, hard work and care, which are undoubtedly a feature in Amish farming. No, I believe that Amish farming thrives due to the low levels of personal drawings. I'd wager that there isn't even a section for personal drawings in the accounts!

'A man's wealth is not measured by how much he has, but by how little he needs.'

On this understanding Sam's riches are immeasurable.

When profit is generated on Amish farms this is invariably used to create opportunity for family members to set up farming in their own right. The Amish stake in Pennsylvanian farmland has grown steadily but significantly. Sam's son is a farmer and Sam told us of his emotions as he helped his son shift cattle to the newly acquired farm. He told us that the tears of joy were not reserved just for his son though. Some months later he had helped another Amish lad move and he experienced the same tears of joy at the thrill of seeing Amish young men pursuing God's work.

Sam's is about the average size of an Amish dairy farm, for there is a ceiling on the size of farm allowed by the Amish rules. This is for two reasons. Firstly, the work load should not be detrimental to a healthy balance of community, family and religious commitments. Secondly, any change towards increasing farm sizes means fewer Amish farmers will get the chance to serve God in this most sacred pursuit.

The Amish community of small farms has its own network of cottage industries; indeed Susie and her daughter have quite a thriving craft shop filled with artefacts made from



within the community. There is no allergy towards wealth creation, I think they are quite canny and will quietly be doing all right.

I believe that the Amish ideology is a superb contrast when considering the flaws in modern society, providing lessons on how to achieve a more sustainable capitalist society. This was emphatically envisaged on the Scholars' Conference by John Ikerd.

3d. Spain

Majorca 2010

My sister decided to get married and this meant my attendance at the brother-in-law's stag do! This was not to be a few bevvies in Batley but a 4 day monster event in Majorca! I was able to get a pass out on the understanding I take the opportunity to research.

Via the internet I sourced a couple of cheese producers and particularly a grass based milk enthusiast (goats). Unfortunately the farmer was on dairy business in milkier Minorca. So I hired a car with another stag-doer for a couple of days around Majorca, finding dairy nuggets. Nice cheese. Language was sometimes a barrier; unfortunately there was no conversation when viewing this next impressive dairy set up. This dairy farmer had a technological yet simple formula that will have exploited the farm's particular strengths.

The hot, dry climate of mountainous Majorca is not ideal for grazing; lucerne and maize are the crops of choice on the lower land. This farm was no exception and the milkers were continually housed. This business was a brilliant example of the farming method matching the farm, starting with forage and finishing with the customer.

The building was for 60 milking cows and was open sided on three sides, the parlour, office and dairy enclosing the other. The milking was robotic and the glass fronted dairy processed a range of cheeses. On the opposite side the Holstein cows were fed TMR placed onto a beautiful white tiled trough surface. It appeared to be a unit that required relatively little routine input. About 30m back towards the farm entrance was the farm house with adjoining cheese shop, small and clean. A little Mediterranean grandma took care of the shop, while still controlling the paella cooking for the family's dinner!

The clinching aspect of this family business is that it was situated next to a fairly busy roundabout, shop and farm displayed brilliantly to passing traffic; a safe, interesting and accessible attraction for would be customers and tourists like myself to come and enjoy and literally buy into the process!

3e. Chile

I visited a few noteworthy farms in Chile, including a New Zealand/Chilean partnership on Chile's largest hacienda called Manuka near the lake district town of Osorno, where thousands of cows were milked in herds from 300-800.

I also visited the largest, most productive herd in Chile, 6000 cows housed on one unit, a beautiful new unit with superb facilities, but still needing to invest in a slurry system that suited international standards. The magnate owner was also wondering about the option of increasing this unit even further, or would developing a new site be more cost effective? This herd averaged 40 litres/cow/day last season but this season were averaging 33. I speculated that this was due to a reduction in inputs due to inflation; particularly as less than 40% of DM was grown on farm. However, I was corrected. The reason for



almost a 20% drop in yield was due to inferior silage quality!

It has been suggested to me that some farmers are put off grazing due to the fluctuations in quality caused by weather, seasonal changes and management. Relying on one or two crops of silage is evidently an even bigger gamble, particularly when large investments are made on the basis of high yields being achieved. Fortunately this year's good milk price had offset the potentially huge losses in the case mentioned.

Sven Bergstrom is acutely aware of the need to minimise capital input when growing his business against a backdrop of price volatility in Chile. He is currently milking 1450 cows on a beautiful pivot irrigated farm near Temuco. He is the husband of the fourth generation of farmers and it has been his efforts that have pushed cow numbers to anything like current levels.

On the farm are two fairly dated parlours, each capable of putting up to 250 cows through per milking and with some yard area to winter a similar number. The ability to get numbers up has depended on low investment so he shifted the calving pattern from 40% in spring to 100% spring calving. This was to enable production to be achieved largely on a self service basis rather than conserving forage and then feeding it out with all the associated paraphernalia. The losses that can be incurred when changes are made to the calving pattern were somewhat offset by the targeted use of one of two of the commercially available and widely used hormones Boostin and Lactotropina, enabling the cows with an 18 month calving interval to still contribute significantly at the end of lactation. His expansion required four new milking parlours but there was no investment in concrete at all, none on walls or roofing and the cost was about £100/cow.

An output of 11 million litres of top grade milk per year from 1450 cows is being achieved with much less capital invested on the depreciating assets of parlours and sheds than that of many enterprises of 60 cows!

They are mobile parlours! Downright brilliant!

Low investment as aforementioned is important on two levels. Firstly is the resilience as alluded to previously. Secondly and just as importantly, Sven is able to stop dairying whenever he wants or needs to. The Chilean dairy market is increasingly dependent on world trade and is subject to the vagaries and volatility that comes with this. Alternatively, another land use opportunity may arise that Sven can easily exploit. How many other dairy farmers of this scale could make such a claim?

During expansion Sven adopted a rotational grazing management system in herds of about 200, using an Australian 'Best-Fed' version, though still incorporating some concentrate, soya, maize, turnips and silage into the feed budget, varying with the seasons. The parlours are brought into the field to the end of the electric fence and the cows gather to be milked to get to the next feed break. On arrival at his farm we went and stood in a field whereupon he informed me that we were in the middle of the area where his cows had been milked the previous day. On closer inspection I could see that there was a slight concentration of cow pats, but otherwise no detriment, bearing in mind that the milking area might be different almost every single day of the year. Fantastic. The milk is cooled with a generator that pumps ditch water through the plate cooler, no problems. After milking the vats are trundled back to base to be cooled fully. A few seasons before oxen had been used to haul the milk home. Oxen and horses are still put to good use both on Chilean livestock farms and in forestry.



After seven years of this method Sven is now considering investing in a rotary parlour, as this has a lower labour cost. The staff on his farm do not relish this idea, they love the mobile system. If I were a gambling man I would bet that this system will still be in place in another seven years, Sven is just wondering what to do with all his money!

The day before I went to see Sven I was at another successful grass based farm, that of Andres Kullmer. He was getting some good results but I challenged the suitability of his Holstein genetics, suggesting that a cross with a Jersey would not only be appropriate for his milk contract, but that he would reap the benefits of improved fertility and mobility, which were the areas that he was most dissatisfied with. Sven Kullmer also had pure Holsteins after breaking away from the traditional German breed of Clavela and I was itching to offer my cross breeding advice again. BUT: the arguments could not be backed up to the same degree. WHY? Sven's cows travelled less on tracks and stood less on concrete than any other cows I have seen, bar sucklers. There was virtually no incidence of lameness. Whilst waiting to be milked the notoriously shy bulling Holsteins felt much more comfortable to ride than they would on an enclosed concrete yard surface. Heat observation was also aided because the herdsmen had a good view of the entire herd at milking time. However, it must be noted that the breeding criteria generally disregarded yield - *"There are no poor bulls for production"* - focusing instead on legs and udders.

His aim is to reseed 10% of his grazing platform every year after turnips, and sees a massive yield increase and improved utilisation accordingly. The native grass species of 'Chepica' is easily outperformed. Sven is one of the few farmers that have

spoken about the different growth characteristics of new ley varieties and chooses according to field characteristics and his own requirements, with a preference for high sugar grasses and value on clover.

3f. France

Erwan et Laurence La Roux

The last trip of my Scholarship tour was with three other Scholars with similar interests, notably Kevin Beatty and Rhys Williams, while Michael Blanche was a sheep farmer focusing on the potential of grazing systems. We were supplied with contacts, translation and specialist input by French/Irish/Australian consultant John Bailey.

Included on the trip was a visit to Trevarez, a research farm in Brittany that had changed emphasis over the last decades from a production system to a profit driven system. As I expected, this had involved a move from high cereal input to high grazing performance using rotational methodology. The inclusion of each kg of concentrate had historically gained 1kg of milk, Holstein genetics adding perhaps a further 10% increase. This is like swapping two ha'pennies for a penny at current concentrate costs and much more profit was generated from stripping out the costs associated with housing and feeding. However, the farmer-led research had not yet gone the whole hog; they seem intent on preserving the Holstein breed. A continuation of their work to compare with cross bred cows would be a rational next move.

Erwan and Laurence farm near the coast in Brittany. We met Erwan at his local café over red wine and mussels. He and his wife have won awards for sustainability and I can see why. They were previously dairy consultants



and were frustrated by the direction dairy farming was going, with this motivation they decided to take on a farm tenancy and follow their own advice. In discussion with Erwan it is clear that a lot of thought goes into their approach to farming. A saying my father likes quoting springs to mind;

‘Live like you are going to die tomorrow. Farm like you are going to live forever’.

By this I am not suggesting that Erwan is a hedonist, rather that a determinant factor in his business decisions is the subsequent effect on time (net income/worked hour), and the ability to maintain an enviable lifestyle and/or allow opportunity for the exploration of new ideas. Currently, he has no intention upsizing from his 40ha farm, but to continue improving profitability. One area he looks at is genetics, picking the useful characteristics in a 4 way cross of NZ Holstein : Danish Jersey : Scandinavian Red : NZ Jersey, which makes for a herd with hybrid vigour that is optimal for the conversion of grass into milk solids.

The livestock beneath the turf is as important as the livestock on top of the turf and Erwan had some interesting ideas to enhance soil quality. A summer supply of forage is needed as the grass growth rate decreases below 10kg/ha/day and demand is 25kg/ha/day. Erwan always aims to supply a mixed summer forage crop such as oats with winter rye, or overseeded clover and vetch. Plantain, chicory and brassicas could also be incorporated. The benefits of a mixed crop are numerous, but the biggest positive attribute he suggested was very intriguing. This was that the root structures of different plants have varying penetrative patterns, and the diversity of root structures is able to alleviate the historical problems of compaction. The benefits snowball on; improved aeration, drainage, water holding capacity, microbial activity. A similar approach is taken with long term leys

(rotationally grazed of course) and as John Bailey observed, there was a ‘virtuous cycle of ruminant, ryegrass and legume’.

3g. Australia

My three week visit to Australia held the widest range of interest for my Nuffield Scholarship. I was privileged to have many meetings and visits with experts and industry leaders thanks to the arrangements made for me by Paul Ford and Karen Delaney of the Gardiner foundation. There was also a whole host of farmers I was able to meet up with who should be highlighted in this chapter.

For example, Terry Hehir made a big impression on me. He farms in the North Victoria dairy region. When I arrived he began: *“The first thing I’ve got to say is that if you are still farming in this area then you are a bloody good farmer, its been really hard here,”* and his earnest expression spoke volumes. The dairy production from that area is continuously shrinking back due to years of crippling drought. Terry had progressed by creating an organic selling group to maximise returns, without investing a penny in stainless steel. On farm the focus was again on grazing management and some principles of organic farming and biodynamics were discussed, though it did seem a bit smoke and mirrors!

I had booked myself into a conference by the Grassland Society of Southern Australia, entitled ‘Global Challenges, Local Choices’. It was truly a world class conference, covering grass issues such as ‘Matching seasonal productivity’, ‘Pastures for purpose – right plant, right place, right purpose’, ‘Holistic approach to ruminant production, encouraging rejuvenation of native swards species.’ Marketing, monitoring, carbon and climate change were also themes, all with reference to optimising or maintaining profits. The final presentation from Julian Cribb



(Google him!) entitled 'The Coming Famine: risks and solutions for global food security' was epic! Every grazier in the conference felt a renewed sense of pride in the product, and the purpose and potential of grassland farming as an answer for future sustainable food production.

The farm which I felt was a showpiece of Australian dairying was that of environmental award winners Graeme and Gillian Nicoll, in Gippsland, the most temperate part of Victoria, SE of Melbourne. Looking around one could see the evidence of generations of nurturing the farm - such as field boundary work and an irrigation lake – work which, as well as being fantastic for wildlife and amenity value, was a functional part of the dairy system. They milk about 300 cows concentrating on good pasture use, though feeding relatively high levels of concentrate in-parlour. The previous year 1.8 tonnes per cow had been fed. This was a very easy way of supplementing the cows. Graeme stated that he treated extra feeding as a simple add-on to his grazing business requiring only a phone call and the press of a button. Dairy consultant John Mulvaney was asked over and we discussed whether feeding at similar levels would still be profitable considering this year's high grain price.

An interesting bar chart I happened to see some days later from another consultant I met at Ellinbank Dairy Research Centre showed, he said, how even a large inflation of

cereal price has little effect on a concentrate user's farm profitability. It is funny how you can extrapolate information differently; the same chart conversely suggests that a plummet in cereal prices would also have little effect on profitability! Cereal feeding is therefore not the profit driver, and indeed there is a risk that a tendency towards supplementation detracts from the true profit driver – grass management.

The Nicolls, like many Australian dairy farmers, were able to exploit the benefits of concentrate, especially when short of home produced feed, with an uncomplicated, relatively low cost system. Research at Ellinbank found that feeding a 'slug' of concentrate was of no detriment in two feeds up to 12kg/day! This level of feeding has been practised as a means of expansion if there is unavailability of neighbouring land.

As businesses continue to expand, (partly because of the opportunities that come about with adversity and volatility) farmers are looking at more alternatives, particularly if the scale of the farms becomes inhibitive due to the distances cows have to travel and the time involved. Ellinbank's latest project is a review of partial mixed rationing: part grass, part TMR, a potential growth area, but involving all the associated investments. This sends alarm bells ringing with me, and also demonstrates a cut off size for efficient grass based dairy farming.

See picture on next page





Graeme Nicoll (left) and myself discussing issues of sustainability.

3h. New Zealand

My travels in New Zealand involved speaking to farmers, scientists, cheese producers, vets and industry executives.

In recent years fantastic results had been bandied about with regard to the correlation of increased stocking rate to increased profits. Many farmers had increased their stocking rates, and a coinciding trend of contract maize production followed in order to supplement at the shoulders of the season and possibly during summer shortages. When I was there it was the beginning of the calving season and there had been a long hard winter with fodder shortages, as was obvious on a visit to Morrinsville Cattle Market, where the poorest new calved heifers were fetching only \$300.

They were painfully thin and would probably be best dried off and left for another year. The disadvantage in New Zealand is that everyone is in the same boat, whereas in the UK the differing farming methods and sectors can be complementary in many ways. A New Zealand system can be followed in Britain, with the benefit of a safety net to prevent such sorry outcomes.

New Zealand farmers tend to be excellent managers though, much motivated by the succession and career structures that are widely adopted, such as contract milking and share milking initiatives. These were demonstrated at their finest at Desiree Reid's (NSch) on the irrigated Canterbury Plains. There is a strong focus on profit drivers. Red Sky statistics show that the primary profit



driver, accounting for 70% of variation between businesses is 'operating expenses/kg milk'. A similar pattern can be extrapolated from DairyCo benchmarking data.

I had an insight from a vet in the small dairy region near Kaikoura (whilst he was stitching up a hunter's pig dog!) He and his wife had moved there after practising on the Waikato. The farms at Kaikoura tended to be long established family units and perhaps more financially secure. Although he regarded them as good farmers, there was less proactive use of the vet, such as for vaccination. Younger businesses, perhaps involving sharemilkers, wanted to eliminate unaffordable risk.

I travelled from Auckland down to Invercargill, superb country, and surely now almost up to saturation point with dairy numbers; there were some unexpected new large units under huge irrigation structures on the high plains in the South Island. There is tremendous pressure to reduce the environmental impact of dairying in New Zealand. Not from the marketplace, but from the NZ public, particularly the hunting and fishing lobby. For this reason dairying in New Zealand is feeling the effect of legislation and red tape that it used to enjoy relative freedom from.



4. The nuances of rotational grazing

The common denominator in the successful pastoral dairy farms I have been to is to aim for profit by effective utilisation of grazed grass and by far the most common method of achieving this is by a rotational or paddock grazing system. Throughout the world there are varying influences upon yield, quality and timeliness of grass supply that will affect management decisions. To most easily convey messages, I make no apologies for relating the lessons learned, and/or reinforced, back to my own farm, but they are relevant to any farmer who grazes.

4a. Three leaf system.

After defoliation by either a cow or a mower the perennial ryegrass plant recovers by growing one leaf at a time. In growing conditions each leaf takes approximately 10 days to grow fully, whereupon the next leaf starts growing. As the plant grows, so does the area for photosynthesis, allowing the size of each consecutive leaf to increase. However, if the plant is allowed to develop a fourth leaf, the first leaf will senesce and wastage will occur.

From this, it is evident that maximum yield has been achieved just as the third leaf has matured, which suggests that this is when the grass should be harvested. This is particularly important to consider at the shoulders of the grazing season, i.e. when demand exceeds supply, and a quick rotation of the grazing would reduce subsequent yield. In the main part of the season there may be forage

shortages; this year for example has been very dry, and a 3 leaf round would have maximised yields thus minimising the need for costly supplementation.

During fast growing conditions, especially when leaves are large, this rule does not apply to the same degree.

4b. A speedier rotation.

In spring months particularly, especially with a fast growing new ley or dense sward, the growth rate can be 100kg/ha/day. The leaf emergence may be faster at 7-8 days but a crop of well over 3500kg can be achieved at 3 leaf stage. This can be more difficult to manage, with a higher number of bites/ plant needed and a reduction in palatability and quality towards the base of the plant. At this bulk there has been a fair amount of shading and this causes:

- ❖ A plateau in growth rate, as maximum leaf area index has long been established.
- ❖ Reduction in water soluble carbohydrates as photosynthesis levels off (due to above) and respiration increases.
- ❖ Less tillering of the grass plant
- ❖ Poor clover growth in a shaded sward
- ❖ A 'rhubarb effect' of the stem and growing point, leaving a longer poor quality residual after grazing.



4c. Grazing by DM levels

Many of the farmers I have visited will have an idea of an optimal grazing height, 2800kg/ha being fairly standard. This level is often at around the 2.5 leaf stage. The farms at Manuka in Chile had a very good method of regular measurement which allowed calculations of average covers and growth rates and enabled a feed wedge to be drawn up, predicting the fields that would be above or below that optimal height. This gave the ability to allocate grass for silage, alter levels of supplementary feeding, make changes in stocking density and/or target fertiliser use accordingly. This is an invaluable tool on Manuka Hacienda for formulaic decision making by herd managers and supplies an instant snap shot for hacienda management.

See **Appendix** at end of this report.

4d. Residuals

Having discussed initial DM levels at grazing, it is just as important to consider the height post-grazing. The optimal height depends upon the previous management. The lower the residual is grazed, the higher the proportion of leaf in the subsequent sward, and the ability for future residuals to be minimised. There is a tendency for the residual height to increase through the season, reducing quality. Grazing at a 2800kg or less enables quality to be best maintained.

There is a trade off on any given day between cow productivity and grass productivity and the best compromise generates the most profit. This can be a difficult concept for many British farmers who may milk cows in a housed system some or all of the year, where maximising dry matter intake is a profit driver. However, on Nathan Pryor's once a day farm,

on Irish Moorepark systems plus on most farms in New Zealand, the extent of compromise towards grass productivity rather than individual cow productivity might be astonishing to a 10,000l Holstein farmer. The maximum profits are generated (if using suitable genetics) on high stocking rates. The effect of high grazing intensity inhibits maximum intakes/cow and may even not achieve maximum yield/ha on the day, but the positive effect of a low residual on subsequent yield and quality achieves best results over a season.

4e. Extended Grazing and Growth Curves.

Many of the dairy units I have visited have limitations in feeding area and housing for winter production and it is obviously imperative to have adequate availability of forage over the lactation. A spring grazing system is generally most suited to matching supply and demand, the peak yield corresponding to peak production. When maximising milk from grass, particularly with a high stocking rate, it is necessary to manage shortfalls at turnout, in summer and at the end of the year.

These shortfalls can be combated by:

- ❖ other forages, as mentioned with Erwan and his French summer drought period, or turnips in Chile. Kale is a crop often used in New Zealand for autumn/winter grazing. Italian ryegrass can provide a spring supply
- ❖ targeted fertiliser use, but this may not be viable in NVZs
- ❖ selection of species and varieties, mixed swards
- ❖ supplementation
- ❖ deferred grazing



At a recent DairyCo event hosting eminent grazing consultant John Roache, his conclusions for maximising profit hinged upon stocking rate and aligning the growth curve with the demand. e.g. Supplementation is most (or only) profitably used when grass growth is inadequate rather than to increase individual cow yield at peak lactation. Traditional management ideas can be turned on their head.

During the grazing season there may be an opportunity to cut the costs of silage making by leaving an area out of the rotation that can be utilised in a summer shortfall and this is possible with an autumn calving herd, i.e. feed it to low-yielders and dry cows. The emphasis is on quantity rather than quality. However, I have also seen successful use of deferred summer grazing used on spring calving units and with traditional systems. On these farms there is a strong requirement for quality. This can be achieved on a clover dominant sward, as clover does not deteriorate like perennial ryegrass.

It is important for an early turnout to have a feed wedge for the start of the season e.g. the last grazing round may start on 15th October and this will not be grazed again until turnout on 15th February. Therefore any grass grown in the last round will be available for Spring. There is a temptation to quickly graze round the farm in winter if conditions allow. This is counter-productive for early turnout and overall productivity as the 3 leaf rule has not been followed. By the same token, winter grazing by sheep will guarantee a late spring turnout, soon followed by an expensive glut of production.

4f. Magic day.

On the first round of a spring calving NZ system the growth rate will be much less than the demand. Many farmers aim for a minimum average grass cover at turnout (eg 2000kg), largely determined by the finish date of the previous season. The round speed and intakes must be carefully monitored to ensure adequate supply for the next round.

'Magic day' is the day in spring when grass growth rate reaches the demand from the herd. Least cost producers measure supply and demand and calculate the date of the 'magic day'. To minimise winter feed costs the grass cover of the farm will be managed to its lowest average levels of the year by this day, in anticipation of the flush of spring growth that exceeds demand.

4g. Regrazing

This is the biggest grazing crime.

When the field has been grazed or mown it is important not to allow the cows to graze off the new lime green shoots that appear after 2 days. This relates to the 3 leaf rule, but has the added inhibitory effect because I am led to believe that the shoots are high in energy drawn from the roots, therefore robbing this energy reduces the vigour of the plant and reduces its ability to repeat the vigour of this early growth stage.

Backfencing or sub-dividing fields will prevent this, and consideration needs to be given to water supply and field access. Many farmers tend to sub-divide any fields that have more than a 2 days' supply, and also allocate a fresh block each half day, so there may be a cat's cradle of electric wires, in which case geared reels and light stakes are invaluable. Moorepark had a labour saving version where



3 grazing allocations were given all at once. Every third grazing made the cows work hardest for dry matter. One farmer in Chile reserved approximately a fifth of daily grass allocation with an electric fence. Once adequate utilisation had been achieved on the

main allocation the fence would be reeled in 'challenging' the cows to eat more. This practice also gave the last cows to the field from the milking parlour a chance to graze full grass cover – they might otherwise have had just tidying up duties!



5. Public perception and health concerns

In conversation with Hannah Sonnegard, the then chief executive of Arla UK, I was questioning whether or not milk from grass fed cows could be a selling point and command a higher premium. The Cravendale brand is sold on its unique filtration system that lengthens the shelf life, and supermarket aligned farm contracts have traceability and standards of production as a selling point. Perhaps sourcing grass based milk can be incorporated into these or perhaps a unique brand can be established? Hannah said that there is no reason why this could not be considered in the future, mentioning though, the pressures on the market, particularly the worrying growth of cheap milk sales in 'pile'em high' stores. Maslow's pyramid was mentioned, suggesting that most consumption choice is determined within the bottom level of the pyramid, so I thought I'd better look this up on the internet.

Possibly prompted by the Nocton controversy, I hear that Compassion in World Farming is currently applying massive pressure within the industry. Apparently all Arla producers are now advised to incorporate grazing into their production on welfare grounds. The fear of God has been put into housed cow farmers and I don't actually think that yielding somewhat to this pressure is helpful. Being a pastoralist, I like the sentiment that is attached to this pressure, but as a practical farmer I would not consider the idea of arguing about the welfare merits of housing vs. grazing. It is a minefield of conflicting opinion, much like the foxhunting debate. High input production can make a valuable contribution to dairying in Britain, as

presented in the Nocton proposal. Enforcing any kind of grazing strategy would be unfeasible in some on-farm situations. In any case, it may be useful to have these points of difference in the future market place!

Grass fed ruminants provide nutritiously dense meat and milk. They also have a claim to be superior to their non grazing counterpart not only for health benefits, but also for taste. This is particularly well documented in meat characteristics, which of course is only of potential dairying relevance when marketing cull cows.

In New Zealand I had the privilege of a guided tour of the Fonterra Research Centre and a discussion with Professor Alistair McGibbon. The NZ dairying giant Fonterra has invested heavily in product development and exposing the merits of their grass fed product is a small part of that.

Whilst at the centre, there was an exercise going on in the taste room. Projects in the taste room may involve different fat contents, processing techniques or new promotions. This test was using a group of Asian students who were new to the area, with the aim of replicating the intended market. A couple of months into the student year would prevent this opportunity, as individual's taste expectations changed!

One of the advantages of milk from grazing animals is that it is significantly higher in vitamin D than that of housed cattle as Vitamin D is synthesised from sunlight. This is an increasingly important consideration. People who are exposed to sunlight will



generally not have deficiencies in Vitamin D. In many parts of the world the damaging effect of the sun encourages full clothing protection. Muslim women are often completely shielded from the sun, and there is an Xbox generation who coop themselves up in their rooms, hardly ever seeing the light of day! Vitamin D can be added in milk processing though this is not the kind of 'value-added' product the British consumer has embraced.

Beta-carotene is recognised as the major precursor of Vitamin A and is an essential part of human nutrition, needed for eyesight, growth, reproduction and maintenance of epithelial tissues. Beta-carotene also acts as a buffer to prevent overdosage of Vitamin A. It is sadly lacking in cereal dominated cow rations and poor quality forages. Again, it is a natural benefit from consuming grass based milk products.

Much of the work of McGibbon has involved CLA (conjugated linoleic acid). Studies way back in 1987 (*Ha et al*) have isolated CLA as having an anticarcinogenic effect. The demonstrable benefits have widened to include inhibition of carcinogenesis and atherosclerosis, inhibition of weight loss induced by immune stimulation, inhibition of diabetes and increase in the percentage of lean body mass: the list goes on. Grass based dairy products are an excellent source of CLA, New Zealand milk having up to 3 times more than that from countries where supplementary feeding is dominant.

CLA has been touched upon in the national press over the last couple of years. Organic milk suppliers have proven to have higher levels of CLA than conventional milk suppliers, though it is undisputed that it is the proportion of grazed grass that is the most significant factor. Linseed has been promoted as a feed additive for tailor made milk to

'achieve CLA levels equivalent to that from grazed spring grass.' Pah! No offence to those that came up with this superb idea that Marks and Spencers have embraced, but again, it is surely the higher levels generated from grazing cattle that consumers will find preferable. Spring grass produces the highest levels of CLA, and this can be somewhat maintained through the grazing season by keeping grass quality up with good rotational management.

The same can be said of Omega 3 fatty acids, and particularly Omega 6:3 ratio. Omega 3 is known to be the beneficial group of fatty acids especially for heart health. There has been a tendency for modern diets to have an imbalance towards excessive Omega 6. Milk has an inherently good balance, but is most favourable from grass fed cows, as can be understood upon examination of a cow's diet.

	Omega 6	Omega 3
Grass	0.3	1
Whole crop	4.0	1
Maize	11.0	1
Cereals / Oilseeds	>10.0	1
Compound feed	16.0	1
Soya	48.0	1
Maize germ	60.0	1

Continuing this theme of the nutritional advantage of milk from grass I was pleased to have the opportunity of meeting with Dr. Mary Ann Augustin and some of her colleagues of CSIRO (Commonwealth Scientific and Industrial Research Organisation) Food and Nutritional Sciences in Victoria, Australia. (See picture on page 20)

There I learnt of the difficulties of using CLA as a tool in marketing. This is because of fluctuating CLA levels, especially with the seasons. The market is more suited to a standardisation as in protein, fat %age and calorie count. What is more, CLA is



notoriously volatile and levels can reduce during processing and handling, as in the lipolysis of fat structure that can occur in pumping and agitation of milk. Finally, the declaration of high CLA levels would involve regular measurements. This test is prohibitively costly.

Dr. Augustin suggested that the most practical method of promotion would be non-specific emphasis of 'the goodness of milk from grass'. To be honest, I was slightly disgruntled with the outcome of this exchange. Dr. Augustin had not told me what I wanted to hear. I would have liked to hear that the grass based dairy industry is on the cusp of a science backed movement that will surely reap a 5ppl margin over and above that of feed-lot type milk.

However, as this opinion concerning the application of science in product promotion comes from the most credible source, it is an important lesson. That is not to say all consumers are not proactively seeking out grass fed meat and milk for specific nutritional gains; there is a growing 'Eat Wild' movement in North America that raves about grass fed ruminant products. With respect though, the Americans can get a bit fanatical about nutrition. I found myself agreeing that a more vague way of promotion with the advantage of scientific back-up would be more useful in the British dairy industry. Anyway, I don't feel entirely comfortable with the idea of product differentiation using what some might regard as scare tactics, it would be like declaring a milk war within the industry. It might be fun for a while but would end in tears!

It appears that wherever you are in the world, including Britain, the idyllic pastoral image is constantly featured in branding, irrespective of production techniques. I would go as far as

to say that the positive image of pastoral dairy farming is being hijacked by the less glossy image of what many consumers regard as 'factory farming.' I have heard many in the industry, including voices from Dairy UK, Arla (my milk buyer) and other farmers, that suggest there is a need to educate or 'reconnect' with the public about modern dairy practices, thus moulding opinions. To me this is a non-starter, I would suggest that much of the discerning sector of the public already feels educated, many of whom are happily represented by pressure groups like Compassion in World Farming and influential thinkers like Hugh Fearnley-Whittingstall.

Grass based dairy farming is regarded as most preferable. Lessons should be learnt from the pig and poultry industry; intensive agriculture relies on damage limitation by imposing ever increasing standards. Even when many of the standards achieved surpass the levels of less intensive methods, intensification has not been held with loftier regard than when animals appear to be nearer to their natural environment. There is an opportunity here, as has been grasped by other sectors, to market our dairy products with this in mind.

Major players in the British dairying industry have a self interest in maintaining the marketability of their milk by ensuring grass based milk is pooled with cereal dominant and/or housed systems, assuming that a price penalty could otherwise be incurred. There is massive industry backing, as intensification is the lifeblood of a supporting system of salesmen and consultants, etc., each promising the way to that elusive thing called profit! However, I would argue that this approach is potentially reducing a price premium to grass based milk, rather than preventing a penalty for the more intensive product.





On tour in CSIRO laboratory.



6.0 Sustainable dairying

People : Planet : Profit : the three P's of sustainability

The previous chapters demonstrate the sustainability of grass based dairying. From the farmer's viewpoint the effective use of grass is a relatively straight forward concept when compared to the barrage of information and advice offered to enable profitable high input dairying. Is it chance that the majority of dairy Nuffield Scholars are grass based? Might it be assumed that progressive young farmers with high yielding cows are too busy sitting on Keenan feeders, or on hand for fire fighting situations, which so often occur in these finely tuned systems? There are some exceptional high yielding herds and managers in Britain, these operators are held aloft as a benchmark for others to aspire to, but at what cost?

A couple of years ago it was stated to our producer group by a producer director that: *"Farmers are going out of business, and it's the wrong farmers who are going, the progressive ones, who have invested."* Of course I empathise with these farmers, but insinuating that bigger is better, and high cost deserves high reward is a nonsense. Yes, growth can be healthy, but *'Growth is the number one reason why businesses fail'* (Dr Kohl 2010), so must be done cautiously.

As taught to me by UK dairy consultant Tony Evans, the financial stability of an individual farm business depends upon three things:

- ❖ Return on capital, >10% would allow for interest fluctuations, opportunity cost and risk

- ❖ Return for management input
- ❖ Return for labour input

Many farms do not satisfy these requirements and thus lose the potential to make a business decision to invest time, money and skills elsewhere, given the opportunity.

Volatility of inputs and outputs is also a major consideration. I would like to be able to farm with minimal input through the farm gate. This does not mean that zero inputs is a goal, rather a capability, to ensure resilience. A grass based system can enable this capability, and as such is a sustainable production method.

6a. Carbon Footprint

There is general agreement that the world's climate is changing. Australia has been the canary in the coalmine concerning carbon and its effect on climate change. Many inland areas have seen a 0.2 degree increase in temperature for six consecutive decades, corresponding with reductions in rainfall, leading to an environment of continuing change and adaptation. (This may include innovation in annual reseeding or cropping for winter grazing, more targeted use of irrigation, or changes in stocking rates and calving periods).

The issue of tackling this by controlling carbon emissions in politics has abated since the Copenhagen discussions turned out to be bit of a non-event. I had limited appetite for research into this and my conclusions have



only heightened my disillusion with the whole concept.

Britain's aim is to reduce its dairying carbon footprint by x million tonnes, but apparently a reduction in our litreage has done the trick! When questioning a Defra official at the grass and muck event whether this would reduce this country's ability to expand production he assured me otherwise. The implications for New Zealand might be less easy to dismiss, dairying being such a major contributor to their economy.

The number of methods used to measure carbon have only recently been whittled down to a handful. At a recent DairyUK conference I attended, the carbon footprint on different types of French dairy farms was compared by Sophie Bertrand, including groups of mountain farms and high input systems. Results were compared on a per hectare basis. A per litre basis is more usual, though there is merit in each. A per litre basis may be misleading, too, though. Looking in the local Tesco the carbon footprint is proudly displayed on the carton. Compare skimmed with whole milk; some carbon gets skimmed off too! A nutritiously dense food gets a poorer credit. When other nutrients get added into the equation milk is one of the lowest carbon nutrient sources and surely not comparable with lower scoring fizzy pop, as eloquently put by Judith Bryans of the Dairy Council.

Caroline Saunders of Lincoln University, New Zealand, was able to compile a model that suggested that NZ milk could be transported to Europe at a lower footprint than our own supply! This is a wake-up call indeed for European efficiency! This model has since been amended but it does bring to light the bizarre way that CO₂ equivalent is weighted equally from animal methane and fuel emissions. No relevance is put on the

unsustainable use of finite resource in a carbon footprint.

There are 'cheats' in the calculations too. If I feed by-products like brewers' grains I get less carbon accredited to me, or if I stick up a few 200kw wind turbines I might be carbon neutral! There are also shortfalls in the current calculations. For example, improved cow genetics for less methane production or grass genetics with higher lipid content to suppress methane cannot be factored in.

Footprint calculation is beneficial though, in that it does highlight inefficiencies on all farm systems; and all systems can achieve similar levels. We have had a calculation done on our farm and our g/l is 1086. Minimum is about 750, maximum exceeds 2000, ours is in the lower quartile. We can make more gains. The figure will improve again with our 11kw wind turbine input. Improved LIC genomics will improve efficiency in the medium term and cross breeding with Swedish Red should further improve our culling rate in future.

Another thing that was brought to light in calculations is the low carbon cost of dairy beef. A visit to a French beef farmer highlighted why this is. The farmer had an impressive herd of Charolais and will have been one of the more capable suckler beef farmers in France. But on good land suckler beef is a waste of resource. From 65ha he was harvesting 15tonnes of carcase and much of the input was sustaining the huge cows. Our Nuffield group calculated that carcase output (albeit of lesser quality) would be easily trebled on a rotational grazing dairy beef system. Carrying on from this, the farmer drew approximately £30k of subsidies, equivalent to £2/kg of meat. This is ordinary, accepted, but in no way sustainable.

To reduce the carbon footprint and improve sustainability of British, European and thus



world food production we need to remove subsidies throughout Europe. The aforementioned examples I have seen across the world support this idea. The Nuffield

Contemporary Scholars' Conference motto in 2010 was 'Adapt, Innovate, Overcome'. The potential to do this is there - in grass based ruminant production.



7.0 Conclusions

1. Most profit at grass is achieved by following rotational grazing rules, to maximise yield, utilisation and quality of the sward, aiming to meet cow and herd requirements, and bearing in mind that other feed inputs will generally impact negatively on grazing performance.
2. Irrespective of method of milk production (ie NZ system, TMR or other), 70% of the variation in profit levels between farms can be explained by their expenditure on inputs.
3. Expenditure can be reduced when the herd requirements are manipulated around the farm's grass growth curve, and vice versa.
4. Milk that is produced from cows that graze grass has significant health advantages, and finds favour with consumers in Britain.
5. Grass based milk can offer the lowest carbon footprint.
6. Success stems from soil, sward then cow; measurement enables management.
7. British dairy farmers **can** safeguard their future, relying on grazing, the profit driver.

8.0 Recommendations

1. Grassland management. All dairy farmers should ensure they use an effective method of measuring DM in terms of kg/ha – and then put that knowledge into effect. See Appendix at end of this report.
2. Use supplementary feeding because grass growth is inadequate, rather than to increase individual cow yields at peak lactation.
3. Before any expansion of your dairy operation calculate your costings minutely. An increase in size and/or turnover might not mean an equivalent increase in profit.
4. To improve sustainability lobby for the removal of agricultural subsidies throughout Europe.
5. A little more common sense should be introduced to the methods of carbon footprint measurement.



9.0 Benefits to me!

This year (2011) has been a superb year to use the knowledge and confidence gained whilst undertaking my scholarship. With almost a maximum stocking rate (for NVZ), nearly 10% more than average, we were aiming to slightly lift the production from our pastures. The cows calved in quite a low condition score, having had a long winter but the season started off very well with dry grazing conditions in March and April, and no incidence of poaching plus good cow health.

We have been in a grass analysis scheme and superb quality results from our high sugar, coinciding with high dry matter, meant that we could take the plunge, dropping concentrate usage down to 2kg/day (basically a few sweeties for the old girls). At peak lactation! Lowest concentrate usage, best ever herd yields and matching last year's individual cow yield at 27l/cow/peak.

In May and June we still had had no rain – less than 30% of our annual average - so we upped the concentrate usage to 4kg/day, in a bid to maintain round length at 25 days. Some grassland farmers, including Erwan in France, were supplementary feeding by this stage to maintain overall farm covers. I took the decision that as long as I didn't speed up round length I could supplement later. If you like, I was hoping for another magic day and trying not to supplement with my meagre silage supplies. Grass analysis is still great.

It's the end of July now. Showers have been teasing us but not having a massive impact. With hindsight I would have been happier putting another 5 days on the round this summer, as the slow growing sward extends

its roots as it extends its leaves, possibly sourcing more moisture. This next month I will take the opportunity of good cull prices to weed out the worst performers and reduce stocking rate. During an LIC discussion group meeting a farmer named Les Scaife coined the phrase *"You can farm yourself into a drought"*. The experiences of globe trotting, especially in drought prone Australia have brought home the needs of the sward which I have been able to consider this year, both at home and in my role as a grazing mentor for the British Grassland Society.

Travels have shown the great dependence of some farms on irrigation, and their phenomenal and consistent production as a result. Even if NVZ regulations allowed, I would be wary to try and emulate their production and stocking levels, as I have more risk of a trough in summer. Low rainfall levels are the biggest limiting factor on my production. I will continue to make a small crop of silage on my milking platform in spring, with the aim of matching intakes with my growth curve during the rest of the year. I also aim to continue calving in March rather than February to reduce pressure at calving. Growing kale spins out the lactation and the grazing round at the other end of the year and gets me a slightly better milk price, due to my milk contract.

Kale was grown on two fields last year, one of which is a hill with different slopes, aspects and soils. Because of the seed bed variability of this field we decided to plant a 'shot-gun' mix, i.e. containing many grass types from drought tolerant cocksfoot to high sugar



ryegrass and three clover varieties. We also threw in some additional mixed grassland herbs to get all the potential benefits of a mixed sward. On the better field we opted for a high sugar late heading diploid ryegrass mix with clover. In both fields we included a mychorizal inoculant. The theory is that it kick starts the colonisation of the beneficial soil microbes that are often present in permanent pasture. Many of the mychoriza are feathery structures that attach themselves to roots, creating a symbiotic relationship as plants use these like an extension of their roots. It's a bit of a leap of faith and I'm not sure the dry conditions will have helped establishment, but worth a shot.

Another introduction I have made is that of Swedish Red genetics. This will improve hybrid vigour and prevent inbreeding. Currently, my biggest gripe is for culling due to cell counts. Swedish Red is the best breed

for udder health, and proven to be highly compatible with NZ genetics.

I suppose it is also important to say what I'm not doing in a rush. Cheese making! I had a hidden agenda to look at cheese production. Cheese makers are dedicated craftsmen, I like the idea but can't see myself doing it. A quote haunts me from the Scholars Conference: *"Between an idea and an action there lies a shadow, this is where the shallow men dwell."*

I have offered facilities to a couple of would-be cheesemakers, hopefully something comes of that, if only to ease my conscience!

I am also not intending to lobby for a superior milk price, though if I were not on a dedicated supply I would definitely try and influence the supermarket buyer to favour grass based milk producers.

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Disclaimer

The views expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust, or my sponsor, or any other sponsoring body.



Acknowledgements

Many thanks for the invaluable opportunity afforded to me by the Nuffield Farming Scholarships Trust and my sponsors the Yorkshire Agricultural Society, to make a voyage of discovery in an area I am passionate about. Brilliant!

Other than from those mentioned in report, I received great help from

Alejandro Luco (ABS Chile)
the Marriots
Martin and Alexa Brown
Christine and Neville
Bert and Alex Peacock
Paul Allen
Zach Ward
John Stones

Many thanks to all of you.

Thank you to those around me for their whole hearted support, as ever:

Mum and Dad : *"I'm supposed to be semi-retired!"*

My wife Cheryl, and the children. x



Appendix : Calculation of optimal grazing height (kg/ha)

Measuring and Monitoring

At Manuka Hacienda in Chile there is a small overall management team, but on each of the numerous farms there is a herd manager and often an assistant herd manager. Measuring requires a simple formulaic approach.

The grazing system hinges on optimal grazing allocation and a little forward planning.

Determining the grazing area is simple enough:

Kg DM cow requirement x No. of cows = total requirement
eg. 10kg x 100cows = 1000 kg DM

Therefore the area allocated should supply 1 tonne DM.

But what does 1 tonne of DM look like? To find out it requires measuring. This can often be done well with an experienced eye, but otherwise the best tool is a rising plate meter¹, methodically 'plonked' across a field to measure average cover. The expected grazing residual is then subtracted (the cows will not graze down to bare earth!).

eg. 3000 - 1500kgDM/ha = 1500kgDM/ha available to graze.

¹ The plate meter (a gadget costing around £300 in the UK) measures both height and density of the sward. This average height of the paddock is measured in compressed centimetres and then converted into kilos of dry matter per hectare via an equation. The method generally used in the UK is $x \times 125 + 640$.

As an example of how it works; the average rising plate meter reading of a particular field measures 6.68 cm. So $6.68 \times 125 + 640 = 1475$, so the cover is 1475kg of dry matter per hectare.

Size of allocation (refer to calculation 8 lines above) is $1000/1500 = 0.67\text{ha}$.

Once the area has been grazed the residual and performance should be assessed. Has too much grass been left? This will leave a stemmy residual that will not be easily utilised on the next grazing round. Or has there been insufficient supply? Although a good clean finish has been achieved there is a costly drop in milk yield. Check the tank!

So the science of allocation must be combined with the art. Various factors will come into play. eg. stage of lactation, condition score, weather, grass quality, appetite.

Where this simple science can really benefit the farm is when measurements are used to forecast supply of forage.

Many of the farms I visited have used measurements to plot annual grass growth curves which gives them a history of the quantity, timeliness and consistency of forage supply. In New Zealand the vast majority of land that is sold or let for dairy use will have these growth curves in its particulars. This enables a best case/worst case scenario to be used in medium and long term management decisions, for determining such things as stocking density, calving dates, choice of grass variety, sowing dates and options for complementary forages to fill in seasonal grass shortfalls.

An advantage for shorter term forecasting is when plotting the "feed wedge". The whole farm is measured every week and put in a bar chart in current order of grazing. i.e. The first bar represents the next field to be grazed. A line can be drawn down this chart starting at a point of ideal cover (2800kg) and finishing at



residual height of last field grazed. This will highlight any surpluses or shortfalls that will occur. So tweaks can be made, e.g. most advantageous timing of N fertilizer, fields allocated for silage production, concentrate

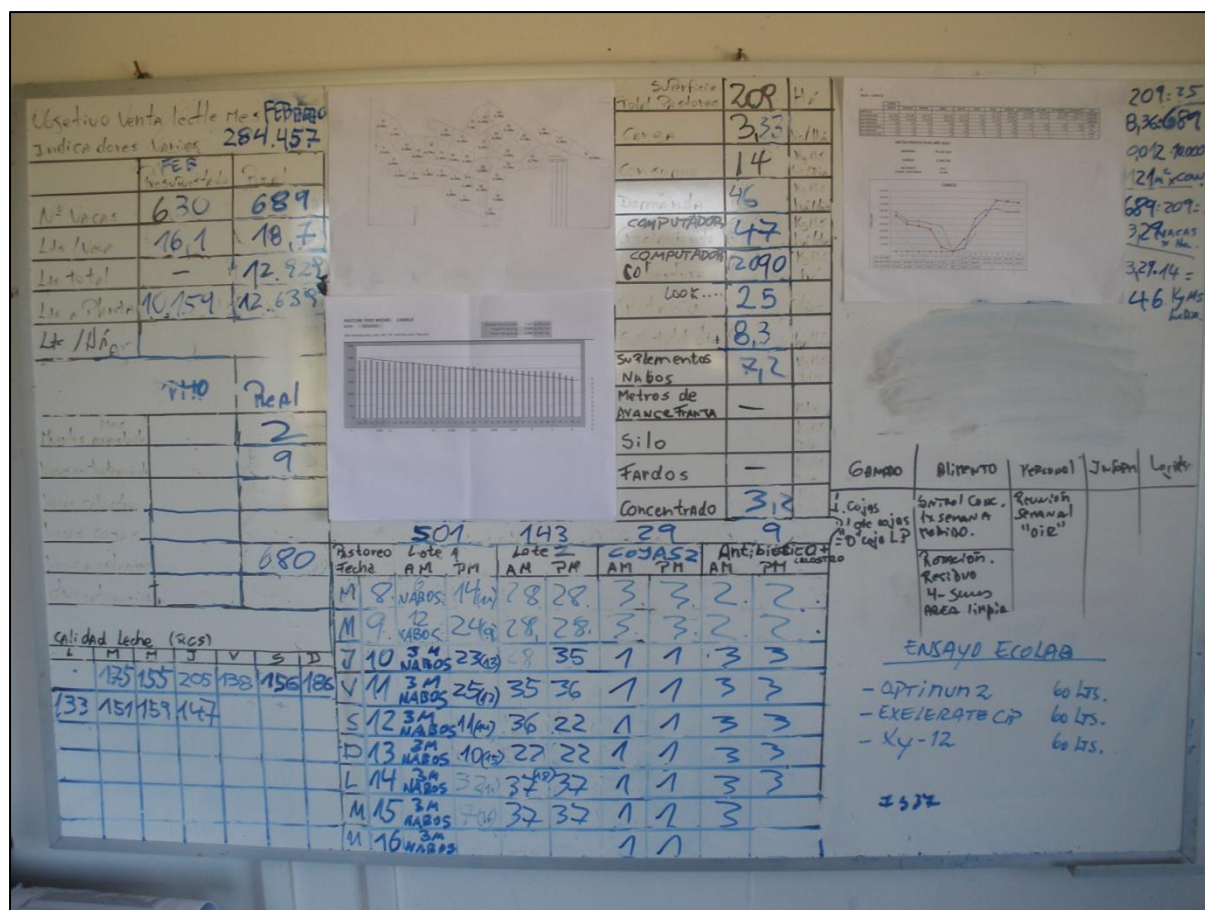
rates altered, grazing round length manipulated.

The two photographs below show all the relevant information chalked up on a dairy wall in Chile.



The second photograph is over the page





A board on a dairy wall in Chile showing DM calculations and grazing plans

Glossary

CLA	Conjugated linoleic fatty acids
DM	Dry matter
g/l	Gram per litre
LIC	Livestock Improvement Company
NVZ	Nitrate Vulnerable Zone
Residual	The amount of grass left in the sward after grazing or mowing
Round	The number of days it takes to utilise the farm in a rotational grazing system
TMR	Total mixed ration

