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IMMIGRATION AND THE NEW ZEALAND DAIRY INDUSTRY

Graydon Sharratt
Director of Greenstone Global and Greenstone Recruitment
11 London Street, Hamilton

Introduction

The aim of this discussion paper is to evaluate the latest Immigration New Zealand residence and temporary entry policy change proposals with a specific focus on the dairy industry. We evaluate the potential impact they have on both dairy farm staff requirements; and likely social impacts.

Current trends in NZ dairy industry

We first review key trends in the dairy industry to give context to the likely effects of the Immigration changes.

Change in dairy farming model

The last three decades have seen a significant shift to larger herd sizes and reduced numbers of herds.

Trend in the number of herds and average herd size for the last 30 seasons

<table>
<thead>
<tr>
<th>Number of herds</th>
<th>Season</th>
<th>Herd size</th>
</tr>
</thead>
<tbody>
<tr>
<td>20000</td>
<td>1985/86</td>
<td>420</td>
</tr>
<tr>
<td>15000</td>
<td>1994/95</td>
<td>320</td>
</tr>
<tr>
<td>10000</td>
<td>1999/00</td>
<td>320</td>
</tr>
<tr>
<td>5000</td>
<td>2004/05</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>2009/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014/15</td>
<td></td>
</tr>
</tbody>
</table>

Source: New Zealand Dairy Statistics 2015/16 report by Dairy NZ and LIC.

Notes:
This is important in the context of immigration policy as larger herds and more technically advanced dairy farms require higher skill levels from staff. Dairy NZ’s recent submission to MBIE notes something that most farmers will attest to - the skill requirements of a Herd Manager on a 1000 cow farm is quite different to that on a 400 cow farm. They cite a study completed in 2012 by Dairy NZ and Lincoln University indicating that the difference in skills levels between a Farm Assistant and a Herd Manager in the top third of farms was about 25% (Source: Dairy NZ submission to MBIE dated 19 May 2017, Carol Barnao)

Pool of New Zealand dairy workers static or falling:

Having been involved in rural banking since 2002 and then dairy farm recruitment since 2006, my experience is that the pool of suitably skilled New Zealand dairy staff is either static or falling. The 2017 remuneration survey by Federated Farmers corroborates this; 46% of the respondents in the dairy industry have found it “not at all easy” or “not very easy” to find employees.

In our opinion, the key reasons include:

- The rapid growth in the dairy industry in the last two decades.
- The continued growth of the New Zealand economy and reduction in unemployment rates (currently 4.7%) provides young New Zealanders with an increasing choice of occupations.
- The reduction in sharemilking opportunities has contributed to a lack of clear pathway to cow and/or farm ownership. This used to be a strong motivator for young New Zealanders entering the farming industry.
- Rising farm prices in relation to profitability have made the pathway to farm ownership more difficult.
- The long hours of work and weekend work on farms, compared to other industries, although my experience is that this has improved substantially over the last 5 years, especially with MBIE’s focus on employee time sheets.
- The isolation of dairy farms in many regions.
- An increasing number of New Zealand employees unable to pass drug tests required by employers as a result of stricter Health & Safety requirements on farm.

Without an increase in available New Zealand staff to fill growing shortages, the dairy industry is relying more and more on migrant workers at most levels, not only to keep farms operating but also to facilitate the productivity gains that the industry has made over the last decades.

Increased reliance by dairy farms on migrant workers

A comparison of the Federated Farmers Surveys of 2013 and 2017 shows that the dairy industry is increasingly reliant on migrant workers at the lower or semi-skill levels.
Not only has the reliance on migrant dairy staff increased as a percentage of the workforce, the actual number of staff employed in the dairy industry has also grown rapidly since 2000, with new jobs being added at an average of 3.7% per year, twice the national average (source Federated Farmers submission to MBIE 21st May, 2017).

As a result, statistics from Dairy NZ show a 114% increase in essential skills work visa holders in the dairy industry from 2010 to 2015 (Source Alan Barker, Diary NZ, MBIE data). Notably this excludes students and many other classes of foreign workers with work rights, also working on dairy farms, so actual figures will be higher than this. The following table sets out this trend:

**Number of Essential Skills work visa holders who were working as dairy farmers by Region**
FY 2009/10 to 2014/15

<table>
<thead>
<tr>
<th>Region</th>
<th>Financial year decided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canterbury</td>
<td>442</td>
</tr>
<tr>
<td>Southland</td>
<td>258</td>
</tr>
<tr>
<td>Waikato</td>
<td>156</td>
</tr>
<tr>
<td>Otago</td>
<td>92</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>32</td>
</tr>
<tr>
<td>Manawatu-Wanganui</td>
<td>30</td>
</tr>
<tr>
<td>Taranaki</td>
<td>24</td>
</tr>
<tr>
<td>Northland</td>
<td>13</td>
</tr>
<tr>
<td>Hawkes Bay</td>
<td>31</td>
</tr>
<tr>
<td>Nelson, Marlborough and Tasman</td>
<td>9</td>
</tr>
<tr>
<td>West Coast</td>
<td>14</td>
</tr>
<tr>
<td>Wellington</td>
<td>2</td>
</tr>
<tr>
<td>Auckland</td>
<td>11</td>
</tr>
<tr>
<td>Gisborne</td>
<td>2</td>
</tr>
<tr>
<td>Region Unknown</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,125</td>
</tr>
</tbody>
</table>

Notes:
Wage growth in the dairy industry:

Our review of world-wide research into the medium and long term impacts of migrants on wages worldwide is mixed and inconclusive. However, in the New Zealand dairy industry, wages have risen in recent years, despite the increase in foreign workers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Essential Skills Work Visa Holders</th>
<th>Mean Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>1,548</td>
<td>$45,903</td>
</tr>
<tr>
<td>2013/14</td>
<td>1,990</td>
<td>$46,017</td>
</tr>
<tr>
<td>2014/15</td>
<td>2,402</td>
<td>$47,998</td>
</tr>
<tr>
<td>2015/16</td>
<td>3,558</td>
<td>$48,391</td>
</tr>
<tr>
<td>2016/17</td>
<td>2,242</td>
<td>$48,556</td>
</tr>
</tbody>
</table>

Source Federated Farmers remuneration surveys and Dairy NZ

Current Immigration New Zealand (INZ) policies

It is our view that the current temporary entry and residence policies do not match the employment requirements of the dairy industry.

Temporary entry visa policies

- An overriding issue is that visa assessment is largely guided by the ANZSCO classification system. The persistent problem is how the ANZSCO relates to the dairy industry because there are only two ANZSCO codes on the extremes of the dairy employee spectrum – dairy cattle farm worker (skill level 5) and dairy cattle farmer (skill level 1). There is no relevant ANZSCO code to cater for the large number of dairy farm workers that fall between these ANZSCO codes. The positions most affected are the semi-skilled positions of Assistant Herd Manager and Herd Manager.

- Most other industries have ANZSCO level 2 or 3 codes to cater for their mid-skilled roles, but the dairy industry does not.

- Immigration New Zealand is led by the skill levels when determining a duration of work visa, as follows:
  - Skill levels 4-5: 1 year work visas
  - Skill levels 1-3: 3 years with a maximum of 5 years in certain circumstances.

- Because of this ANZSCO code anomaly, all dairy visa applicants judged at skill level 5 currently receive a one year work visa, exacerbating the financial costs and uncertainty involved for both employee and employer in applying for visas each year. In comparison, any trades worker at skill level 3 will likely obtain a three year work visa.

- The requirement for one year work visas has substantially increased the load of INZ branches for processing applications – application processing times in Canterbury is currently 6-8 weeks. Given the importance of farm workers during the calving season, such slow processing of work visa applications is unacceptable to the dairy industry.

- Importantly, the occupations of Assistant Herd Manager and Herd Manager were removed from the Immediate Skills Shortage Lists (ISSL) in 2016 by Immigration New Zealand.
against strong submissions by Federated Farmers whose arguments were correctly based on empirical evidence of skills shortages within the dairy industry.

- In our Immigration advisory business, our dairy farm employers consistently obtain clear Skills Match Reports from WINZ and the Canterbury Hub for all dairy farming levels, throughout New Zealand (more pronounced in the South Island due to their extreme shortages).

- This corroborates the Federated Farmers 2017 remuneration statistics showing that 46% of dairy farmers are finding it “not at all easy” or “not very easy” to find employees.

- Based on the evidence we have recommended in our submission to INZ that both Assistant Herd Manager and Herd Manager be immediately returned to the ISSL and the Skills/qualifications requirements for these roles be set at the following:
  - Herd manager (HM): Certificate in Agriculture level 2 and two years relevant experience
  - Assistant herd manager (AHM): Certificate in Agriculture level 2 and one year relevant experience.

**Residence visa policies**

In Immigration instructions only skill level 1-3 occupations generally qualify for points for residence. The current Skilled Migrant policy requirement is for a dairy farm applicant to be substantially at Skill level 1 level (farm manager). This assessment regime has become increasingly complicated within the multi-farm corporate dairy farming model. For example on large herd farms, 2ICs or Herd Managers are most often not regarded as skilled by Immigration New Zealand, yet farm managers on 250 cow farms more accurately meet INZ instructions and are regarded as skilled. Most farmers would agree this makes no sense as the complicated nature of a 2IC or Herd Manager role on a large farm at least equals the responsibilities of a farm manager on a smaller farm.

Furthermore, the following policy changes in August 2016 have made it more difficult for dairy farm employees to qualify for residence:

---

Notes:
• Most applicants must now sit an English language test and obtain a 6.5 score to be
considered for residence. With many migrants from the Philippines and South American
countries, these levels of English competencies may not be met.
• The minimum threshold for the total number of points claimed was increased from 140 to
160 points. This means that many applicants now need to claim points for a qualification at
level 5 or above before they can achieve the overall points threshold to qualify for
residence.

New policy announcements by Immigration New Zealand

In this election year, as always, there is a particular focus on immigration policies. The
Government has released its latest residence and temporary entry visa policies to be
implemented in August 2017. In doing so the Government claims that it is seeking to address
the following:
• Entrenched low or semi-skilled migrant workers and families who remain in New Zea
land for many years on temporary entry visas but who have no pathway to residence.
• Employers being incentivised to avoid employing and training New Zealanders.
• Possible downward pressure on wages in industries due to employers using migrants to fill
shortages in the labour market.

To date the public has not seen the research on which the Government’s proposed policy
changes are based or the possible effect of these policy changes. Unless the data that we have
requested from MBIE (not received at date of publishing) counter the research currently
available in the public domain on the dairy industry, our opinion is that these changes have been
poorly thought through and have not been considered on an industry by industry basis and
certainly not on a region by region basis.

As already shown in this report, the Federated Farmers remuneration surveys over the last
number of years have shown increasing dairy farm salaries, despite the increased migrant
workforce. This has proven, that in the dairy industry at least, the fear of downward pressure on
salaries is unfounded.

Specific changes proposed by INZ

For the dairy industry, there are three main areas of change announced by Immigration
New Zealand that will affect employment within this industry:
1. South Island contribution visa
2. Residence visa instruction changes
3. Temporary visa instruction changes.
South Island “contribution visa” policy

Implementation date: This has already been implemented on 22nd May 2017.

This is a once off “work to residence” visa category. All applications must be submitted before 23 May 2018.

The objective of this policy (WR7.1 of INZ Operations Manual) is as follows:

- Recognise well-settled temporary migrants who have made a commitment to New Zealand and their South Island communities; and
- Meet genuine regional labour market needs and contribute to individual firm productivity, by enabling employers to maintain an experienced workforce; and
- Minimise the risk of displacing New Zealanders from employment opportunities or hindering improvements to wages, working conditions or industry-wide productivity growth.

Key features of this policy

The key features of this policy are as follows:

- This is a one-off pathway to residence for long term temporary migrants in lower skill jobs that have held Essential Skills visas for 5 years or longer for jobs in the South Island.
- First stage: a 30 month “work to residence” work visa issued for the principal applicant and suitable visas issued for partners and dependent children of the applicant.
- For those two years the principal applicant must remain working in the industry associated with the occupation specified on their most recent Essential Skills work visa; and in the region in which their current employment is situated.
- Second stage: after two years a “residence from work” resident visa may be issued.
- The Residency approval will have a 2 year endorsement, requiring that the applicant remains working in the South Island in the region and industry specified on their visa throughout a period of 24 months.
- There are no English language requirements.
- There is provision for Filipinos who have previously submitted false documents.
Effects of this policy:

- This is an important opportunity for those South Island migrants that do not meet current Residency criteria under the Skilled Migrant Category (SMC).
- Overall our view is that this is a proactive government move and will add support to many applicants remaining in the South Island for another 4 years at least.
- Many South Island dairy farm workers will benefit from this announcement as it removes two key limitations of the SMC category:
  1. That the current job does not have to meet “skilled employment criteria”
  2. That the applicant does not have to meet English language requirements.
- This will also prevent what is currently happening with many SMC applicants on dairy farms, which is having to seek farm manager positions on other farms in order to meet “skilled employment” criteria of SMC (most mid-tier dairy roles not being considered “skilled” for SMC purposes). Many have built up excellent relationships with current employers, and these can be continued, enhancing stability of the South Island dairy farm labour force.

Our Concerns regarding this policy:

- We feel there is no logic not to include North Island applicants in a similar situation. The only reason we can see for excluding North Islanders, is Immigration New Zealand fearing too many North Islanders will be caught in the net.
- However the logic applied to South Islanders is equally compelling and applicable to North Islanders in the same situation for the following reasons:
  - From a statistics point of view, including North Island applicants in this position will not negatively affect Immigration figures as the Immigrants targeted in this section of policy recommendations are already considered long term migrants the way that the government measures “permanent long term arrivals (PLT’s).
  - Including North Island applicants will actually remove a large burden from these applicants, their employers and Immigration New Zealand resources (less work visas for these applicants going forward).

Changes proposed for the Skilled Migrant Category

Implementation date: 14 August 2017

Key changes proposed in this policy:

1. Two remuneration thresholds to be introduced:
• A minimum threshold of $48,859 pa based on a 40 hour week ($23.49 per hour) for occupations with skill levels 1-3. Below this threshold, occupations will not be considered skilled.

• If not at skill levels 1-3, then jobs with salaries above $73,299 pa based on a 40 hour week ($35.24 per hour) will automatically be deemed to be skilled. However, the salary will need to be justified.

• Middle band income earners will still be assessed under current skilled employment instructions.

• The minimum salary band will affect many retail, healthcare and hospitality migrants who may currently hold jobs considered skilled for Residency purposes. These industries have average salaries that currently fall below the proposed minimum threshold.

2. Changes to SMC points:

• Increased points for skilled work experience but work experience must be at a “skilled” level.

• Bonus points for incomes over $97,718 pa based on a 40 hour work week ($46.98 per hour).

• Removal of some bonus points for absolute skills shortages list, identified future growth areas, close family in NZ.

3. Changes to the assessment of “work experience”

• In order to claim points for work experience, this experience must be at an ANZSCO level that was “skilled”.

• This is different to how Immigration instructions are currently written, which accept most “relevant” and “recognised” work experience.

Likely effects on the dairy industry

The proposed changes to the Skilled Migrant Category will, at best, not make applications for residence in the dairy industry any easier and, at worst, make applications for

Notes:
residence a whole lot harder. The full effects will only be clear once Immigration Instructions are released.

We believe the main effects of this policy change will be as follows:

1. The first issue to note is that the above income thresholds are based on 40 hour weeks, and therefore will need to be adjusted for most dairy farming positions, where the norm is average work hours throughout the year closer to 50 hours per week (taking into account peak periods over calving/mating and quieter period over the summer months and when cows are dry).
   - For example, if an employee works 50 hours/week average (2600 hours in a year) their taxable salary per annum at $23.50 per hour (including accommodation) will need to be above $61,100 pa.
   - This will cause confusion in dairy farming where most salaries are usually annual salaries (not per hour).
   - No doubt previous year’s timesheets will be requested to prove the number of hours usually worked, in order to work out a per hour salary.
   - An increased focus on the market value of farm accommodation will also result.

Using the 2017 Federated Farmers remuneration survey figures, in the table below, none of the lowest three occupations in dairy will meet the minimum salary thresholds for their employment to be considered skilled. This is not a significant change from current policy, where Farm Assistant, Assistant Herd Manager and Herd Manager occupations are not currently judged as skilled anyway.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Mean salary</th>
<th>Total hours worked (assumed at 50/week)</th>
<th>Total salary per hour</th>
<th>Do mean salaries qualify or not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Assistant</td>
<td>$40,960</td>
<td>50</td>
<td>$15.75</td>
<td>No</td>
</tr>
<tr>
<td>Assistant Herd Manager</td>
<td>$46,315</td>
<td>50</td>
<td>$17.81</td>
<td>No</td>
</tr>
<tr>
<td>Herd Manager</td>
<td>$52,215</td>
<td>50</td>
<td>$20.08</td>
<td>No</td>
</tr>
<tr>
<td>Farm Manager</td>
<td>$65,651</td>
<td>50</td>
<td>$25.25</td>
<td>Yes</td>
</tr>
<tr>
<td>Operations Manager</td>
<td>$69,417</td>
<td>50</td>
<td>$26.70</td>
<td>Yes</td>
</tr>
</tbody>
</table>


2. Notably, only a few dairy farming applicants will meet the threshold of $35.24 per hour at which the employment is automatically considered skilled regardless of skill level, after adjusting for hours worked.
   - For example, if an employee works 50 hours/week average (2600 hours in a year) their taxable salary per annum (including accommodation) will need to be above $91,650 or above to meet this requirement.
   - In our experience there are few dairy farm managers who are paid near or above this level, apart from experienced farm managers on large farms.
• However, this does not mean these applicants will not qualify as skilled, it only means they will have to prove skilled employment in the same way they currently have to prove it (not based purely on salary).
Therefore, the introduction of the higher salary threshold for skill levels 4-5 is likely to have a very small impact on the status quo for applications for residence within the dairy farming industry.

3. The value of accommodation will become a key area as dairy farmers have traditionally kept tax value of accommodation as low as the IRD would allow, in order to minimise tax payable by employees. Of course, this has changed in recent years due to IRD pressure, meaning many accommodation values have already risen but our opinion is that these will rise again now.
• No doubt INZ will ask for rental valuations or the like in order to prove that accommodation values are market related and realistic for the location and type of accommodation.
• Any increases in accommodation rental values will lead to higher taxable salaries and therefore higher tax paid by the applicant.

4. In the new INZ announcements, in order to claim points for work experience, all relevant work experience will have to be at a skilled level. Based on current ANZSCO codes, this will imply farm manager experience only.
This is a significant cause for concern within the dairy industry (and many other industries) because many skilled workers (including dairy farm managers) work their way up a skills ladder to where they qualify for skilled positions.
In the past, work experience relevant to the current position could be considered (including experience at the lower skill levels of farm assistant, assistant herd manager, herd manager etc). Now it will not. Points for work experience can often mean the success or failure of a residence application (the new points system will provide for up to 50 points for 10 years of experience). The new policy will therefore make it even more difficult for dairy farming applicants to have sufficient points to qualify for residence, unless they can prove previous relevant experience at a skilled level.

Notes:
5. Overall, the changes to residence policy will make New Zealand a much less attractive option for migrants within the dairy industry.

6. **Changes proposed to the Essential Skills policy**

   Implementation date: August 2017

   It is important to note that the proposals for temporary visa changes are **not yet finalised**—they are out for public consultation, submissions were due by 21 May 2017. However, even though this date has passed, if dairy farmers still feel that the proposed policy settings are not correct, they should still consider lobbying through their MPs and industry bodies.

   It is our opinion that the changes proposed to the Essential Skills policy will have a far-reaching effect on the dairy industry and, more broadly, on rural communities country-wide.

   **Key changes proposed:**
   1. Remuneration levels would likely replace ANZSCO as the main determinant of the skill level of an essential skills visa holder. However, as these thresholds are based on a 40 hour work week, as we have shown most dairy workers up to Herd Manager level will fall within the lowest skill level.
   2. Visa lengths will be guided by the same salary bands that apply to the Skilled Migrant category (lowest band will obtain one year visas).
   3. Essential skills work visas for people in the lower band (<$23.49 per hour) will only be allowed to remain in NZ for up to 3 years, followed by a one year obligatory “stand down” period outside of NZ.
   4. Partners of lower skilled workers will likely only get visitor visas, unless they apply for work visas based on essential skills policy or other visa types such as student visas. The length of these visitor visas has not been clarified yet by INZ.
   5. Dependent children of lower skilled workers will likely not be able to get fee subsidies as domestic students. They will pay international student fees if they intend to go to school and these costs can be over $10,000 per annum.

   **Likely effects on the dairy farming industry:**
   1. As shown previously, most occupations within the dairy industry will fall in the skill level 4-5 categories when the remuneration thresholds are applied.
   2. Therefore all work visa applications for positions at herd manager and under will only obtain one year work visas. This is actually not a departure from the current visa duration situation, as none of the mid-tier dairy roles are currently on the Immediate Skills Shortage lists and therefore obtain 1 year visas.
   3. Currently, only the occupations of Assistant Farm Manager and Farm Manager are listed on the Immediate Skills Shortage Lists. An issue that needs clarity here is whether visa length
determination based on remuneration levels will supersede the Skills Shortage lists or the other way around. For example if a position is on the Immediate Skills Shortage List (ISSL) and all criteria are met and salary is in line with market, but salary is below the remuneration threshold mentioned in the new policy, which Immigration instruction overrides the other?

- This may have an effect on length of visa where ISSL positions currently are granted at least 2 or 3 year visas, for good reason: there is an acknowledged skills shortage in that industry and job type.
- Therefore it makes sense that there should still remain in policy, a minimum 2 or 3 year visa for all ISSL applications, despite the introduction of new salary thresholds.

4. The key impact of the proposed changes will be on the partners and dependent children of work visa holders and therefore will have a social impact on many rural communities.

    Whilst the current Immigration website FAQ’s state “Families already in New Zealand will be able to remain here for the duration of the Essential Skills visa holder’s stay in New Zealand. This will minimise any immediate disruption to families and communities”, there are no clarification details yet, which means that we are unsure what rules will apply to the family members of applicants currently in New Zealand versus those from overseas.

    - Realistically not many partners will be able to obtain visas in their own right because an applicant has to have a full time job offer of at least 30 hours per week. Many partners cannot undertake full time employment if they have young children, or they may not have the skills/qualifications required. Furthermore, the isolation of many farms and necessity to travel long distances reduces the number of employment opportunities available for partners of dairy farm workers.

    - Many partners are employed on-farm as the half person required over calving. Their current open work visa conditions allow them to undertake this employment whereas the proposed changes may not. Dairy farmers may therefore lose a valuable pool of relief workers who are already living on farm.

Notes:
• Many rural communities will also lose a portion of a valued migrant labour pool, specifically aged care workers and other seasonal workers, jobs often undertaken by partners on open work visas.
• The likely result of the policy changes is that many partners will not accompany work visa holders to New Zealand.
• Most migrants in the lower skilled category do not earn enough and do not have the funds to pay the very high international school fees for their children. It is therefore likely that dependent children will not accompany their parents to New Zealand.
• Migrants from certain countries often bring their families to New Zealand. They will not leave family behind. This makes New Zealand an attractive long-term option for them. Such source countries include UK, USA, Canada, South Africa, Europe and potentially South America (for example). The changes may cause these potential migrants to choose other destinations over New Zealand.
• The pool of migrant workers will therefore come mainly from countries where migrant workers are more used to working alone offshore, or are more prepared to do so. For example, this has traditionally been Philippines/Nepal/India/Sri Lankan workers. This is not necessarily a bad thing, but policy makers must be aware of these likely effects and adjust if this is not their intended outcome.
• The policy changes will have a significant impact on rural and remote communities for the following reasons:
  • Many will not have partners socialising in communities, nor children at school so isolation and lack of integration will be enhanced. This can only lead to further alienation of migrant communities from New Zealanders
  • Rural schools in remote areas that are currently supported in numbers by migrant children will have falling school enrolments, leading to pressure of school closures on already vulnerable rural schools. Sports clubs and community groups will also feel the effect of reduced family participation.
5. Lower-skilled workers who remain lower-skilled, will only have three years to roll-over visas and then have to leave New Zealand:
  • Employers in remote locations experience substantial difficulties in employing staff and will experience the added stress of having to train up staff only to lose them after three years and then, in many cases, have to employ new migrants from overseas.
  • Migrants may work for shorter and shorter periods in New Zealand as it is not sustainable to be away from their families for three years at a time.
  • A “rotating door” will inevitably emerge and employers have to face more and more instability in their labour force.
Conclusion

Our opinion is that the proposed Immigration changes in their current form, will be detrimental to both the dairy farming industry, which is already facing substantial skills shortages, and rural communities that have become increasingly dependent on migrant families to sustain their schools, churches, clubs and local economies.

Source of data

In addition to our company’s own experience of over 11 years recruiting for dairy farms in the North and South Island, we are Licenced Immigration Advisors and manage work and resident visas applications for farm staff from all over the world.

For this paper, we have consulted widely in the dairy industry including discussions with Policy Advisors from both Dairy NZ and Federated Farmers regarding their recent submissions to MBIE.

Other data and information has been sourced from New Zealand census data as summarised by Natalie Jackson (Natalie Jackson Demographics Ltd), as well as the Federated Farmers Salary Surveys and Dairy NZ and/or LIC statistics through their research and obtained from MBIE through Official Information Act (OIA) requests. We have made our own requests for key data used by MBIE in their decision making process but this has not been processed at date of this publication.

All source data and authors are acknowledged as accurately as possible.

References

Dairy NZ Submission on the suite of proposed changes to Essential skills visa 19 May 2017.
Federated Farmers. Farm Employee Remuneration Reports 2013-2017
Federated Farmers. Submission on the suite of proposed changes to Essential skills visa. 21 May 2017.

Notes:
MBIE Cabinet Paper (March 2017). Report back on remuneration thresholds for migrants under the Skilled Migrant Category.


PLUGGING THE LEAKS – HOW FERTILISER MANAGEMENT HELPS REDUCE N AND P LOSSES FROM DAIRY FARMS

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Introduction

Retaining your social licence to dairy farm increasingly requires you to reduce the off-farm impacts of your activities on the surrounding environment. Given the current focus of central and local government on maintaining or enhancing ground and surface water quality, dairy farmers should minimise, where possible, nitrogen (N) and phosphorus (P) losses from their farms. Obviously, N and P fertiliser applications add these nutrients to farm systems to increase or maintain pasture and forage crop production and so may contribute either directly or indirectly to losses of these nutrients from your farm to the environment.

The purpose of this paper is to discuss ways of reducing direct losses of nutrients from fertiliser to the environment. Direct fertiliser losses are relatively low, provided that good management practices are employed when using fertilisers on farm.

Nitrogen cycling on dairy farms

Nitrogen fertiliser, legume N fixation (Figure 1) and bought in feed are the main external sources of N supply to your farm. However, much of the legume N and the supplementary feed N enters the soil through the breakdown (mineralisation) of dung, urine and plant residues (Figure 1). The biochemical processes of mineralisation, nitrification and denitrification, mediated by soil microorganisms, then converts all sources of N into ammonium and nitrate ions which are then able to be used by plants but also can be prone to gaseous or leaching loss from the soil (Figure 1).
Figure 1: Diagram of the N cycle in agricultural systems (from McLaren and Cameron, 1996)

**Indirect N losses**

The major source of nitrate (NO$_3^-$) leached in grazed pastures is the N returned in urine from the grazing animal (Di and Cameron, 2005) and as some of the urinary N may have been derived from animals grazing N fertilised pasture, this constitutes indirect fertiliser N loss. Indirect N loss is arguably more difficult to tackle because of the complex nature of farm systems and the interaction of N fertiliser with those systems (Shepherd and Lucci, 2011). In order to reduce these losses there is a wide range of management practices and system changes that are being researched or have been implemented by farmers to increase the N efficiency of grazed pastoral systems (Monaghan et al. 2007; De Klein et al. 2010).

**Direct N losses from fertiliser**

**Gaseous losses**

Direct N fertiliser losses arise after fertiliser application and could be as gaseous losses (ammonia, nitrous oxide or nitrogen gas) by volatilisation (Figure 1) or leaching loss of N from fertiliser granules. Enhanced efficiency fertilisers (EEFs) are being produced by companies manufacturing and marketing N fertilisers to farmers. Urea fertiliser, in particular, can lose N content as ammonia gas during the dissolution (hydrolysis) of urea after application with New Zealand trial work showing an annual average N loss of 15% with a range 7-20% (Bishop and Manning, 2011; Sherlock et al. 2011). A urease inhibitor N-[n-butyl] thiophosphoric triamide (NBPT) coated onto urea fertiliser has been shown to decrease ammonia volatilisation from urea fertiliser (Watson, 2000) by an average of 50% in New Zealand pastoral conditions (Sherlock et al. 2011; Zaman et al. 2013). Volatilisation losses of urea fertiliser may also be effectively
reduced by applying low rates of application (e.g., 30-50 kg N/ha) to pastures with reasonable cover and which receives at least 10mm rainfall or irrigation within 8 hours of application.

Nitrous oxides are of less agronomic importance, being a very small proportion of losses of applied N, but are clearly important as a potent greenhouse gas. The use of dicyandiamide (DCD) has been shown to decrease nitrous oxide losses from urea by slowing nitrification (Zaman et al., 2008). Currently, DCD is not used in New Zealand because of potential food residue issues.

While minimising direct gaseous losses of N fertiliser will improve N fertiliser use efficiency i.e., potentially, a farmer will get a better response to the N fertiliser applied and may contribute in a minor way to reducing greenhouse gas emissions, these losses represent a very minor contribution of N loss to the environment.

**Leaching losses**

Risk of loss of N fertiliser by leaching can be minimised by good fertiliser management practice. If soluble N fertilisers are applied to wet soils which then receive enough rainfall or irrigation to induce drainage, then some of that nitrogen will be lost in the drainage water. In particular, avoiding application in the winter months when growth rates are slow and drainage through the soil can leach, fertiliser N has been shown to be important (Ledgard, 1986). Losses potentially can be large (Figure 2) and reported to be as much as 30-50% of N fertiliser from winter applications (May-July) in the Waikato (Ledgard, 1989) and Canterbury (Cookson et al., 2001).
Phosphorus cycling in grazed pasture

Phosphorus inputs onto the soils of your farm primarily come from fertiliser P, animal manure and supplementary feed (Figure 3). Like N fertiliser, there are both direct and indirect losses of fertiliser P.

Indirect P losses

In pastures grazed by dairy cattle, indirect losses of P from soil account for about 30-50% of total paddock losses (McDowell et al., 2007). Where soils are potentially erosion prone, soil-P losses may account for more (i.e. nearer 50%) of paddock P losses compared to stable soils.
Direct P losses from fertiliser

Timing and form of P application

If good practice is followed, direct fertiliser P losses are relatively small i.e., less than 10% of total P lost from pastures (McDowell et al., 2007a). For fertiliser P to be transported by overland flow into waterways, the soil has to be saturated and the rainfall intensity has to be high enough for runoff to occur before the fertiliser P has had the opportunity to be washed into the soil. Surface runoff travels only about 20m in a worst-case scenario (e.g., dry soil, heavy rain) and soil structure and type, pugging and pasture cover are important factors governing P loss via overland flow.

However, if good practice is not followed, then P losses from fertilisers can account for the majority of P losses from a farm. For example, between 1.2 and 3.4 kg P/ha was lost from a 50 kg P/ha winter application (as superphosphate) on a pallic soil in either overland flow or soil drainage (Sharpley and Syers, 1979). Generally, the potential for soluble P fertilisers to be lost in either overland flow or drainage reduces quickly with time after application. Within 30-60 days the P lost from soil with soluble P fertiliser applied will equal the same as soil with no soluble P fertiliser applied (McDowell et al., 2003). However, the potential soon after application is directly related to the solubility of the fertiliser applied (Figure 4) with the risk of direct P loss in the order superphosphate > serpentine super > reactive phosphate rock (McDowell and Condron, 2004; McDowell and Catto, 2005).

Notes:
Figure 4: Comparison between solubility of different P fertiliser forms and potential for P loss risk.

McDowell et al. (2003) has indicated that within the first 60 days of superphosphate application, if a significant storm event occurs that causes overland flow, the concentration of dissolved P could be high enough to contribute to water quality problems from land closely adjoining streams. In this situation, the loss of P from RPR will be much lower and will not significantly contribute to poor water quality over the same time period (60 days). Over the longer term, P losses are likely to be the same regardless of fertiliser type. In some environments, storms only occur 3-4 times per year during predictable times. Where storms are more frequent, the timing is less easy to predict and for fertilised land in close proximity of a P-sensitive water body, then RPR application will reduce the risk of direct P loss from fertiliser over that first 60-day risk period. The economics of using RPR in comparison to superphosphate should also be considered when balancing farm productivity with environmental impacts.

**Optimum Olsen P levels**

Soil Olsen P should be maintained within the range of concentrations considered optimal for pasture production and not excessive for any given soil type. Since the magnitude of P losses from soil via overland or subsurface flow is proportional to soil P concentration (McDowell et al., 2003), having an Olsen P concentration above optimum represents an unnecessary source of P loss and an unnecessary waste of the fertiliser P inputs. However, maintaining optimal soil Olsen P does not totally prevent P losses from occurring. Some soils can lose a lot of P at optimal Olsen P concentrations for pasture production e.g., soils with little Al and Fe oxides such as Podzols (McDowell and Condron, 2004). Furthermore, if a soil is already P-enriched then it can take many years for Olsen P to decline unless soil is cultivated, perhaps during cropping or regrassing, to remove surface enrichment and redistribute P within the plough layer (Sharpley, 2003). The risk of P loss from generating high soil Olsen P levels is greater on soils which have a lesser ability to retain fertiliser P additions. The ability of soils to retain P is
measured by the anion storage capacity (ASC) laboratory test. There is less P lost in overland flow on soils with higher ASC values than those with lower ASC values at the equivalent Olsen P test level (Morton et al. 2003).

![Figure 5](image)

**Figure 5:** The relationship between soil Olsen P and P loss as influenced by anion storage capacity (in brackets). Dotted line is the water quality limit for P in surface water.

**Conclusions**

The direct losses of the nutrients N and P, which are both essential for productive dairy farms but of environmental concern if they end up in surface and ground water, from fertiliser applications can be minimised if good practice around fertiliser applications is followed on farm. This good management practice can be encapsulated by the following: right product, right time, right rate and right place. After that the greatest losses of N and P will come from the farm system itself in terms of N in animal urine patches and P loss caused by sediment and dung movement to surface water. To reduce these losses on farm may require greater or lesser farm system changes depending on individual farm physical, climatic and management factors.

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Notes:
References


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SUCCESSFUL SUCCESSION PLANNING

Peter Flannery
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Introduction

What to do about the succession of family owned farming businesses has become a much discussed topic. The scale, complexity and the capital invested within farming operations has increased significantly over the last 25 years in particular. Coupled with this, society in general has become more enlightened with regards to fairness.

Why is it so difficult?

Conquering family succession is not an easy task. This is not surprising when you consider:

• The family farm normally has a huge amount of heritage, and is considered “home” for not only those that live there, but also for other children who have long since moved away. There are huge emotional ties.
• The amount of capital tied up within a farming business can be eye wateringly significant.
• The bulk of that capital has come about through capital appreciation as opposed to retained profits.
• Profitability has historically been less than the cost of capital. Therefore, the ability to remove capital from the business is difficult to achieve.
• Parents are having to consider the future sharing of capital with those they most love.
• Not all brothers and sisters share the love, particularly when there is significant wealth at stake.
• In-laws come with their own set of values, which in my experience can be very complementary, but are sometimes viewed with suspicion.

Notes:
• People are living longer. Mum and Dad in their 60s see there is still a bit of “kick in the old horse yet”. Meanwhile the successor(s) in their early 30s may be married with their own successor already born, and are keen to make their own mark.
• Every family is different and there is no off the shelf solution.

Where to start

Like many things in life, starting is the hardest thing to do. Not knowing how to start, or what process to follow prevents many from starting. I am sure the lack of a deadline does not motivate people to start either.

Succession planning is perceived as being important but not urgent. Why start today when you can start tomorrow? The trouble with this concept is that when it does move from important to urgent, the effectiveness of the plan will most probably be compromised.

An important consideration right at the start is that a family succession plan must be written by the family for the family. A plan cannot be bought off the shelf, and cannot be written by someone else.

Whatever the reason, sooner rather than later a start must be made. Whilst there is no off the shelf solution to a family’s particular situation, there are some guiding principles and a best practice process to follow, which will increase the probability of a successful outcome.

To my mind there are four pillars upon which to build a plan. These are:
1. Build a strong business first
2. Communication
3. Fair comes before equal
4. Understand the difference between ownership and control.

Within those four pillars, a process has been developed based around strong communication and letting everyone have their say.

Pillar One - Build a strong business first

This may sound rather obvious, or even defeatist. The brutal truth is that if the existing business is only strong enough to support the current owners, then trying to pass the business onto the next generation will result in one of two things:
1. A millstone will be placed around the neck of the successor. This will result in disillusionment with the successor and possibly resentment from the rest of the family if the farm is “lost”.

Or
2. The terms of the plan will have to be so favourable it will result in Mum and Dad not having sufficient capital or income to have the retirement they deserve. Other siblings will also most likely “miss out”. Naturally this will lead to inter-family resentment.

The smaller the pie and the more mouths there are to feed, the fewer option there will be. The reverse holds true.

In all cases, regardless of the scale of the business, the succeeding business owner must bring something to the table. This may be in the form of:

• capital
• off farm income, or at the very least,
• youthful enthusiasm, motivation and commitment matched with an ability to continually improve the business.

If the business lacks scale or profitability, and the successor cannot bring enough to the table to sustainably make a difference, there is only one option. That is to sell the assets and for Mum and Dad to look after themselves in the first instance, and surplus capital to be distributed as and when appropriate.

**Pillar Two - Communication**

Communication must be at the heart of any plan. The purpose of the communication is to “flesh out” the underlying needs of the entire family. Unless there is a strong understanding of everyone’s values, purpose and vision, decisions will be made on assumptions. Assumptions lead to misunderstandings. Misunderstandings leads to conflict.

The sooner the communication starts the better. The younger the children, the less formal the communication should be, and as they mature the communication should become more formal and structured. For many families there has been little or no communication regarding business succession.
This creates a vacuum of knowledge and understanding. It is a scientific fact that a vacuum will not stay empty for long. If a vacuum cannot be filled with facts, it will be filled with assumptions masquerading as fact. Perception is reality.

For example if I am the likely successor, who has spent the last 5 years helping to build the business and I have no knowledge of what Mum, Dad and my siblings are thinking, and vice versa, we will all fill our heads with our own thoughts of what others may be thinking. The danger is that this will lead to misunderstanding, suspicion, jealousy and ultimately conflict. If this goes on unchecked the situation will become untenable.

Most advisors have dealt with families in this situation. Conflict has arisen, most probably through poor communication. By the time the advisor arrives on the scene all that remains is for the advisor to shut the stable door because the “horse of reason” has long since bolted and can be seen disappearing over the horizon. Shut the door, he won’t be back.

Once perceptions become entrenched, they turn into reality and can be incredibly difficult to turn around.

By the time a natural successor (or two) in waiting, has put down their own roots, with a partner and family, the need to start communicating is becoming increasingly urgent.

You don’t necessarily need an advisor or independent to be part of the communication process. However the later the start the greater the value an independent can add. They will help remove the fear of starting and can filter and manage any unrealistic viewpoints.

The process I follow is to interview Mum and Dad, to uncover their values, needs and vision for:

- themselves
- their family, and
- the family business.

I then separately interview all family members and their spouses to uncover exactly the same thing for:

- themselves
- their wider family (wider family means Mum & Dad, brothers, sisters, spouse and children)
- the family business.

The benefit of doing it this way is:

- They can find it easier to speak more openly away from other family members.
- They are forced to consider what everyone else’s needs and views maybe.
- They are able to voice their own vision for themselves in a way that can be communicated with the wider family.
Once everyone has been interviewed, a one page matrix table for each member of the family is used to record everyone’s responses and all responses are circulated to all family members.

I then bring the family together to discuss the full range of values, needs and vision. This is the starting point of understanding the barriers to a successful outcome, and then the plan can be designed to try to overcome these barriers.

This is often the first time the family has had these discussions. It is not uncommon for these meetings to enhance inter-family relationships. They gain a deeper understanding of each other’s needs and opinions and this can often garner a greater level of respect for each other.

**Pillar Three - Fair comes before equal**

There is a difference between being fair and being equal. Just because a succession plan is equal does not necessarily mean to say it is fair. The basis of any succession plan must be built on the pillar that it is fair to all parties. This may or not differ from being equal. Not only should a plan be fair, it must also be seen to be fair. This is why communication and understanding everyone else’s point of view is so crucial.

The definition of what is fair will differ with every family. Going through a communication process as discussed above will help define and reach agreement on what is fair. Many factors will influence what is fair.

Consider the following:

- A lump sum payment to non-farming family members now is more valuable to the recipient than say 30 years’ later on the death of a parent.
- If there are no business successors, fair and equal will most probably be the same thing.
- If, during a period of capital growth in land values, family ownership of the farm has been retained purely due to the farming efforts of a successor, is it fair for the successor to have to financially settle the other siblings equally?
- If a successor has taken financial risk in growing the business, should the returns of that gain be shared equally with the rest of the family?

Notes:
• How should a successor who has committed themselves and worked within the business for a lengthy period of time be fairly treated compared to others who have made their own way in life outside of the business?
• How should a successor who has worked for less than a market wage for a number of years be fairly treated?
• If, over a number of years, a successor has contributed their own capital towards increasing the productive capacity of the farming business, how should they be fairly compensated?

The difficulty is, every family’s situation is different. Equality can be objective. It is easy to calculate an equal split. However, fairness is very subjective and is much harder to determine.

This is why communication and understanding everyone else’s point of view and needs is so crucial. I can’t stress this point enough.

**Pillar Four - Understand the difference between ownership and control**

There is a big difference between ownership and control, and there needs to be a strong understanding of both. It can also be difficult to get the balance right.

I can relate my experiences with two different families. Prior to my involvement, a significant proportion of ownership had been handed to a son at a relatively early stage and on very favourable terms. In both these two examples, the father struggled to relinquish any control to the son. In both instances it wasn’t because of a lack of trust, it’s just that the father was used to making the calls and held firmly onto to the rudder.

In both cases, this created tension between father and son. In both cases the sons were married and had started their own families, but were treated as “the boy”. In the end, both situations deteriorated to a relationship with no trust and respect. It was easy to point to the son and think, “spoilt little brat”. Equally though you could look at the father and say “stubborn old bugger”. Thought had been given to allow the son to get “skin in the game”, but no thought had been given to shifting some of the responsibility to the son.

Another situation I became involved with, involved a son and daughter-in-law who had assumed full control, mainly through evolution rather than any one big decision. Dad still helped out on the farm from time to time, but all decisions were made by the son. There had been no discussion around the succession plan, and this started to create tension. Because of a communication vacuum, the son and daughter-in-law started wondering if they were ever going to get an opportunity for ownership – “slogging our guts out so others can benefit”. Meanwhile, the other siblings were thinking that the son and daughter-in-law were going to “get the lot”. It wasn’t until we had a full family meeting that suspicion was replaced with fact, the plan was formed, and any likelihood of conflict was nipped in the bud.
Therefore, ownership without control and control without ownership can be as equally damaging to a family relationship. Balance and expectations need to be carefully managed. The only way this can be done is through strong communication.

Summary

Family succession is a difficult situation to fairly conquer. The fear of the unknown or just not knowing how to, may be putting people off from starting. However nothing was ever achieved without starting. There are many different ways to approach the subject, however not all of these will be effective.

There are however some guiding principles and a best practice process to follow, which will increase the probability of a successful outcome.

To my mind there are four pillars upon which to build a plan. These are:
1. Build a strong business first
2. Communication
3. Fair come before equal
4. Understand the difference between ownership and control.

Within those four pillars, a process has been developed based around strong communication and letting everyone have their say. Having an independent to lead the family through the process can add significant value. They will help remove the fear of starting and can filter and manage any unrealistic viewpoints. However they and the family must understand it is not the independent’s role to “write the plan”. The independent’s role is one of facilitation.

Having an understanding of values needs and vision, and how this can be fairly achieved is the starting point of the plan. Ownership structures, tax advice and asset protection come later. Finally a plan is just a plan, it is not an outcome. People’s needs and vision change over time. Whether it be births and deaths or marriages and divorces or simply just the passing of time, needs will change. Therefore the plan needs to be frequently reviewed. How often will depend on the individual family dynamics.

Notes:
PREPARING FOR A FARM ENVIRONMENTAL AUDIT

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Abstract

With increasing expectations to demonstrate that we are operating our farms at good management practice (GMP), Farm Environment Plans (FEP) and Farm Environmental Audits are fast becoming part of our on-farm vocabulary.

In Canterbury, FEPs and Audits form a key component of our regulatory and industry framework. But if you’re not in Canterbury don’t switch off! With changes to council regulations throughout New Zealand, and greater demand to prove to our consumers we are operating at good practice, it’s safe to say they’re here to stay in one form or another.

Farm Environment Plans are a risk management tool, they help us to identify environmental risks on farm, put a plan in place to address them and provide assurance to our regulators, customers and the public that we are doing the right things at the right time and are committed to making improvements where we need to. Farm Environmental Audits assess how we are tracking against the identified environmental risks and good management expectations set out.

The Canterbury context

In Canterbury, the Land and Water Plan (LWRP) requires FEPs to be implemented and audited on farm. Consent Conditions require that your FEP is audited within twelve months of consent being granted. Once audited the first time your grade will dictate the frequency of audits to take place.

FEP Audits do not replace effluent or irrigation consent monitoring normally undertaken by Environment Canterbury.

Notes:
I'm not in Canterbury?

All over the country, Regional Councils are taking steps to introduce FEP’s in various forms as part of their packages to implement the National Policy Statement for Freshwater Management.

- Southland – New water and Land Plan requirement to have a farm management plan with variations of consenting regimes according to physiographic zones. You must farm in accordance with the management plan and provide it to Environment Southland on request.
- Otago – Nutrient limits coming into force, but no formal management plan in place yet.
- Waikato, Horizons and Hawkes Bay Regions are also in the process of designing FEP requirements.

You might not be required to have your farm environment plan audited just yet, but the council may eventually want to check that you’re operating in accordance with your management plan or your supply company might start to ask questions. All indications are that the public, the regulators and our consumers have increasing interest and expectations of what is going on inside our farm gates. My advice would be to start or continue a culture of operating at Good Management Practice and record keeping now so that it if/when requirements evolve in your region you are ahead of the game. Don’t lost sight of the fact that Good Management Practice is Good Business Practice.

Canterbury FEP audit regime

Who are the auditors?

Certified FEP Auditors are independent consultants and are not employees of Environment Canterbury. You will need to select and book in an auditor yourself unless your scheme or collective is managing this for you. The current group of certified auditors are a mixture of farm and resource management consultants.

Certified FEP Auditors are required to:

- Have 5 years’ farm systems experience - either on farm or in a consultancy role
- Have completed both Overseer Courses - Intermediate and Advanced
- Have completed training and certification assessments through Environment Canterbury
- Be a member of a professional organisation such as NZIPIM.
Audit grades and frequency

Within Environment Canterbury’s FEP Audit system, audit grades are not strictly pass or fail but are graded based on an A, B, C or D grade. Most consent conditions for individuals do however require an A or B grade to be achieved to maintain compliance.

A - Operating at GMP or above for all management areas
B - On Track
C - Off Track to meet GMP
D - Low confidence of meeting one or more GMP objectives.

After the first audit, the timing of your next FEP audit is dependent on the grade you achieve.

A - Re-audited in 3 years, or 4 years if within an irrigation scheme or collective
B - Re-audited in 2 years
C - Re-audited within 12 months,
D - Re-audited within 6 Months
A change in land use or management will also trigger a new audit.

What is the auditor grading you against?

There are the base set of objectives and targets that the FEP Auditor is grading you on during your FEP audit which align with the targets, objectives and actions you have set out in your Farm Environment Plan.

The base set of objectives and targets audited against are set out as an appendix to this paper. Your consent or irrigation scheme may have added or removed other objectives and targets to be included in your FEP.

The objectives and targets are related to the Good Management Practices specified in the booklet of industry agreed good management practices and are specified in the schedule attached to your consent. The auditor will only audit against the objectives and targets that are relevant for your farm.
**Compliance/good management interface**

**Figure 1.** Compliance & Management Practice Hierarchy

Farm Environment Plan auditors are not warranted compliance officers and are not on farm to determine compliance, rather to assess whether you are operating at GMP. FEPs and audit expectations are raising the bar of expectation and while you could lump them in together, there are some key differentiations when it comes to audits. Compliance is the bare minimum requirement usually required by your existing consents. Good Management may require more than the bare minimum.

For example, an existing effluent consent granted 10 years ago may only require 5 days effluent storage to be marked compliant in your effluent inspection, but good management practice requires that effluent systems are designed and managed to be able to comply 365 days a year and sufficient and suitable storage must be available to store effluent and any wastewater when soil conditions are unsuitable for application. So, you may have been marked compliant – meeting the bare minimum- in your effluent inspection but not be meeting the standard for good management practice with respect to your Farm Environment Plan audit.

**What do you need to provide the auditor prior to your audit (outside of scheme farms)?**

- A copy of or access to your Farm Environment Plan
- Your nutrient Budget- xml file. This is your overseer file, ask your nutrient management advisor to send it if that’s easier
- Copies of your consents - Irrigation, effluent, land use
- Any Health and Safety and Biosecurity Requirements
- Any previous audit reports and action plans
If you’re with an Irrigation scheme with a Land Use Consent, your scheme environmental manager will advise you when booking an audit.

**What do I expect on the day of the audit?**

An FEP audit for a dairy farm should be expected to take 2-3 hours on farm. This will consist of time around the dining table or in the office and time looking around the farm. Every auditor will have a slightly different style as to which parts they like to do first but the information they’re looking for is the same.

If you’re a lessee, a Sharemilker/ contract milker or manager, it may be useful to think about your farm owner/operations manager being at the audit. The auditor is interested in speaking to the person who is responsible for the day to day management of the farm in accordance with your FEP, but will also want to look at and talk about whether farm infrastructure is fit for purpose it is useful to have the right people in the room for those conversations.

**Demonstrating that you’re operating at good management practice - the prove-it-factor**

When the auditor comes to see you, they’re undertaking what is called a Level of Confidence Assessment. Sounds a bit eerie fairy, but in basic terms the auditor is asking, how confident am I that this farm is achieving or working towards the required good management practice objectives and targets?

Level of confidence assessments are based on assessing the likelihood that each objective and target is being met. The auditor needs to consider whether there are systems and processes in place that effectively manage on farm environmental risks, whether you meet the GMP standards and whether you meet the nutrient limit set in your consent.

For each target and objective, the auditor needs to see objective evidence and provide reasons for and against their level of confidence assessment in their report. The auditor is required to grade each objective and target either a High, Medium or Low. The number of highs, mediums and lows add up to your audit grade with Objectives graded according to the

Notes:
number of highs and lows at the target level. Any Low at the Objective level = a D grade, highlighting the importance of ensuring you’re operating at good management across each of the management areas.

![Figure 2](image.png)

**Figure 2.** The strands that build level of confidence.

As illustrated by the string in Figure 2, the auditor needs to combine what they are observing, the discussion that they have with you during the audit and the records that you have kept and provided to build their level of confidence assessment. Each component provides strength to confidence.

Examples of evidence include:

- Operating procedures
- Fertiliser/effluent records
- Staff training
- Well maintained infrastructure/maintenance and calibration records.

A list of examples of records to keep for evidence are included in Appendix B of this paper.

**Hot tips**

- Get yourself on board. Understand the Why, understand what the requirements are before the auditor shows up.
- Read your FEP; understand what is in it. Put yourself in the auditors’ shoes.
- Get your team on board - give them tasks, involve them in your FEP Actions, build a culture of implementing Good Management Practice.
- Ask yourselves the question, “Can I Prove I am Doing a Good Job for the Environment?”
- Systems and Processes.
- Keep Good Records.
• Ensure your nutrient budgets are prepared by someone who is suitably qualified and experience in preparing compliance nutrient budgets and understand what the nutrient budget is telling you.

• Good Management Practice is good business, tackle these requirements with a good management attitude rather than a compliance attitude and it will be much easier to get yourself and your team on board.

**Key take homes**

• Seek advice/help where you need it - there is a lot of support out there.

• It gets much easier when you understand what is expected.

• Keeping good records and systems and processes in place is key to providing evidence you are operating at, or working towards, good management practice.

**Follow up self-assessment activity before your next FEP audit**

Go through the list of objective and targets in Appendix A and think about what evidence you would be able to provide. A useful resource for doing this quickly is the Dairy NZ Good Management Practices Guide, this booklet has tick boxes of examples of GMPs and the evidence you might provide.

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Notes:
Appendix A - Objectives and targets graded

What is the auditor grading you against?

These are the base set of objectives and targets that the FEP Auditor is grading you on during your FEP audit. Your consent or irrigation scheme may have added or removed other objectives and targets to be included in your FEP. The auditor will only audit against the objectives and targets that are relevant for your farm.

Below are the standard objectives and targets present in the auditor template as of 6/6/2017.

Irrigation management area

- Objective: To operate irrigation systems efficiently ensuring that the actual use of water is monitored and is efficient.
- Target 1. New irrigation infrastructure is designed, installed and operated in accordance with industry best practice standard.
- Target 2. Existing irrigation systems are maintained, calibrated, and operated to apply irrigation water at the optimal efficiency.
- Targets 3 & 4 All applications of irrigation water are justified on the basis of soil moisture data, climatic information and crop requirements.

Nutrient management area

Nutrient budget robustness check

Nutrient Budget: Nutrient Budget Robustness Check. The FEP auditor will go through your nutrient budget to ensure that the budget has been prepared by a suitably qualified person, that the input standards have been followed and that there are no discrepancies or inconsistencies within the nutrient budget. This is just one part of the FEP Audit. Your consent or irrigation scheme will have a Nutrient Loss number that you need to comply with. Your Nutrient budget will be compared against this to see if it meets your consented Nutrient discharge allowance.

The auditor is required to undertake a robustness check of the nutrient budget for the property, which includes the following checks. Overall, the checks are to determine whether the farm system operated aligns with what has been modelled, and that the modelling undertaken
Nutrient management practices

- **Objective:** To maximise nutrient use efficiency while minimising nutrient losses to water.
- **Objective/Target 1.** Nitrogen losses from farming activities are at or below Good Management Practice Loss rates for the property.
- **Target 2.** Phosphorus and sediment losses from farming activities are minimised.
- **Target 3.** The amount and rate of fertiliser applied do not exceed the agronomic requirements of the crop.

Notes:
**Soils management area**

- Objective: To maintain or improve the physical and biological condition of soils in order to minimise the movement of sediment, phosphorus and other contaminants to waterways.
- Target 1. Farming activities are managed so as to not exacerbate erosion.
- Target 2. Farming practices are implemented that optimise infiltration of water into the soil profile and minimise run-off of nutrients and sediment.

**Collected animal effluent area**

- Objective: To manage the risks associated with the operation of effluent systems to ensure effluent systems are compliant 365 days of the year.
- Target 1. Effluent storage facilities and effluent discharges comply with regional council rules or any granted resource consent.
- Target 2. The timing and rate of application of effluent and solid animal waste to land is managed so as to minimise the risk of contamination of groundwater or surface water bodies.
- Target 3. Sufficient and suitable storage is available to store effluent and any wastewater when soil conditions are unsuitable for application.
- Target 4. Staff are trained in the operation, maintenance and use of effluent storage and application systems.

**Management area water body - riparian drains, rivers, wetlands, lakes**

- Objective: To manage wetlands, riparian areas and surface water bodies to avoid damage to the bed and margins of a water body, and to avoid the direct input of nutrients, sediment, and microbial pathogens.
- Target 1. Stock are excluded from water bodies in accordance with regional council rules or any granted resource consent.
- Target 2. Vegetated riparian margins are maintained to minimise nutrient, sediment and microbial pathogen losses to water bodies are minimised.
- Target 3. Farm tracks, gateways, water troughs, self-feeding areas, stock camps wallows and other sources of sediment, nutrient and microbial loss are located so as to minimise the risks to surface water quality.

**Management area - point source - offal pits, farm rubbish, silage pits etc.**

- Objective: To manage the number and location of pits to minimise risks to health and water quality.
• Target 1. All on-farm silage, offal pit and rubbish dump discharges are managed to avoid direct discharges of contaminants to groundwater or surface water.

• Non-Irrigation Water Use

• Objective: To use water efficiently ensuring that actual use of water is monitored and efficient.

• Target 1. Actual water use is efficient for the end use.

Notes:
Appendix B

*FEP records/evidence checklist*

During your FEP audit, the auditor needs to undertake a level of confidence assessment to determine where you are at with achieving the required good management practice targets and objectives. In order to undertake this assessment, the auditor needs to view evidence of your practices on farm.

This is not an exhaustive list, nor is it imperative that you have every individual item on the list available. However, you should be prepared to give sufficient evidence to the auditor for each of the objectives and targets from the records you have available.

*FEP actions:*

- Date completed, who was responsible
- Evidence action was undertaken (e.g. receipts, photos etc)
- Evidence progress has been made to achieve actions

*Irrigation:*

- DIY Maintenance records (e.g. [http://irrigationnz.co.nz/news-resources/irrigation-resources/irrigation-system-checklist/](http://irrigationnz.co.nz/news-resources/irrigation-resources/irrigation-system-checklist/))
- Maintenance receipts/register
- If complaint has been received, proof issue has been addressed
- Winter servicing invoice
- Bucket/uniformity test results
- Soil moisture (measurements or budgeting)
- Soil temperature, rainfall, PET
- Staff training/induction records
- Irrigation application depths/timing
- Code of Practice Certificate, system design, irrigation system evaluation and Commissioning reports
- Events log (e.g. noted water irrigating road/leaky seal and what you did to fix it)

*Fertiliser/Overseer:*

- OVERSEER nutrient budget or other N calculation model
- Date, time, location, type and rate of fertiliser application per nutrient budget block
- Soil test results
- GPS fertiliser tracking records (ground and aerial applications)
- Spreading calibration and maintenance records (if you spread yourself)
- Stock type/numbers/ages/weights (numbers averaged per month)
- Nutrient management plan /agronomist recommendations
- Type and area of crop, how/when cultivated, how/when harvested, yields
- Imported and exported supplementary feed (type/amount)
- Milk production (kg MS/season)

**Effluent:**
- Effluent management plan
- Application depth, location and time of liquid and solid effluent applications
- DIY maintenance records
- Maintenance receipts
- Bucket/calibration tests
- Backflow prevention test results
- Staff training records
- Dairy NZ WOF
- Dairy Effluent Storage Calculator and/or effluent pond design specifications
- Events log

**Biodiversity/waterways/soils:**
- Riparian planting plan
- Evidence of good practice which cannot be seen
- Receipts for planting/fencing/troughs

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**Notes:**
DEVELOPING A LOW-COST PORTABLE WINTER STAND-OFF SYSTEM

Jane Chrystal¹, Mike Hedley², Ross Monaghan¹, Dave Horne² Rogerio Cichota¹
and Seth Laurenson¹
AgResearch¹ and Massey University²

Summary

A standoff pad wintering system is currently being developed as a cost-effective alternative to both traditional grazing of winter brassica crops and the housing of cows. Compared to the impacts of traditional grazing of winter brassica crops, the pad enables cows to graze brassica crops in situ while reducing the loss of contaminants to receiving waters and minimising soil damage.

The pad is placed close to the cropped paddock, allowing cows to graze the crop in a duration-controlled manner i.e. cows are held on the pad for 18 hours a day and graze brassicas for the remaining 6 hours. The pad comprises an impermeable liner over-laid with a geotextile ‘carpet’ which provides a layer for cow comfort. Solid effluent is scraped and stored while liquid effluent is held in a small sump and applied daily to neighbouring pasture using a low rate, low depth irrigation system. The pad can be relocated around the farm in subsequent years as the paddocks used for cropping change.

Background

Dairy cow wintering in southern New Zealand most commonly involves the grazing of brassica crops in situ. This system is relatively low-cost compared to alternative wintering systems, such as barns and wintering pads, due to the low cost of the crop, low labour requirement, no standoff structure needed, and no effluent storage or irrigation required. However, grazing at high stocking densities during winter, combined with high winter rainfall and excessively free-draining soils or heavy soils and/or sloping land can result in large contaminant losses (nitrogen (N), phosphorus (P), Escherichia coli (E. coli), suspended sediment (SS)) to water (Chrystal et al. 2012; Monaghan et al. 2002; Orchiston et al. 2013;
Smith et al. 2012). Traditional grazing of winter crops is coming under increasing scrutiny from those who are seeking alternatives to reduce the losses of pollutants to the environment (e.g. Regional Councils) but barns and wintering pads that can be used to mitigate these losses are high-cost and require feed to be brought to the animals. Much of the wintering occurs on support blocks, which can be located many kilometres from the milking platform with its associated standoff facilities and effluent system. The research question is: Can the adverse environmental effects of wintering on brassica crops be mitigated by providing standoff facilities? The standoff facilities would have to be low cost and easily constructed because wintering blocks are often leased rather than owned. This paper outlines the concept of the pad system and evaluates the design and management (animals and effluent) of the pads built for this study. Experimental work was conducted in three parts. Experiment I evaluated the suitability of three products to provide the flooring materials for stand-off pads. Experiment II evaluated the construction and management of the preferred pad surface, when integrated with grazing a brassica crop. Both experiments had the approval of the AgResearch Invermay Animal Ethics Committee (experiment I # 12825, experiment II #12343). Experiment III evaluated a land application system for effluent generated from wintering pads that would minimise losses of N, P, \textit{E. coli} and SS to water. This involved testing the concept of applying liquid effluent to pasture over winter using a low rate, low depth effluent sprinkler system (LRLD, e.g. K line).

**Experiment I - Initial pad**

An experiment was conducted to determine if:

1. a pad could be constructed that could capture the excreta and rainfall deposited on the pad surface
2. There was an existing, commercially available product, suitable for cow comfort and outdoor use as a surface on a pad.

A small pad was established in March 2013 on Invermay farm consisting of an impermeable plastic liner (Figure 1; Photo A) and the three different pad surfaces. The three cow comfort surfaces trialled (Figure 1) were:

1. **Cowmax™** carpet (Figure 1, photo A), a geotextile carpet designed for dairy farm laneway stabilisation. Produced by Geofabrics, formerly Maccaferrri (www.geofabrics.co.nz). This was a low-cost, durable surface found to be highly acceptable to cows as a free-stall matting in an earlier study at Massey No.4 Farm.
2. Kura interlocking rubber mats (Figure 1, photo B) designed for bedding areas in dairy barns. (www.numat.co.nz)
3. A rolled rubber matting (Figure 1, photo C) designed for lining laneways within a dairy barn. (www.numat.co.nz).
The pad was established by topping and rolling the paddock to ensure nothing sharp could puncture an effluent liner from below; this liner was laid out in one piece (Figure 1, photo D). The cow comfort surfaces were then placed on the top of the liner (Figure 1, photos: A, B & C). To stop effluent flowing off the sides of the pad, the liner was laid over a round deer fence post (Figure 1, photo E) and held down with another fence post. This created a bund around the pad and allowed effluent to drain into a collection sump. The pad and the three individual surfaces were then fenced off with hotwire and cows were stocked at a density of 4 m² per cow which is the Industry recommendation for cows held less than 12 hours day⁻¹ (DairyNZ 2014). Electric ‘gates’ were placed at the top of each pad section (Figure 1, photos: F, G & H). Bale feeders were located at the top of the pad and water troughs at the bottom. In this initial ‘proof of concept’ experiment animals were held on the pad during the day (8am until 5pm) and returned to a pasture paddock at night.

**Experiment 1 results**

From the initiation of the trial, there was a noticeable reluctance of the animals to lie down on the rolled rubber mat which had become very slippery. This was probably an indication of their insecurity due to a lack of stable footing when they attempted to stand up again, so after 6 days the rolled rubber surface treatment was removed from the trial due to animal welfare concerns.

The remaining two surfaces were monitored for 4 weeks. At this point the geotextile Cowmax™ carpet was selected as the surface to construct the second pad with. The reasons for this were: that it had better grip when wet than the Kura interlocked mats, it seemed to draw moisture away from the surface and the cost was $19 m⁻² compared to $85 m⁻² for the Kura mats (for a full pad assuming 9 m² cow⁻¹ the costs would be $171 and $720 cow⁻¹ for Cowmax™ and Kura matting, respectively). Table 1 outlines the advantages and disadvantages of the three surfaces trialled here.
Experiment II – wintering on a pad

The next stage of the experiment was to build a pad with the geotextile surface and use it to accommodate a mob of 20 cows for 18 hours a day grazing a brassica crop for the remaining 6 hours a day. This experiment was run during the winter of 2013. A second mob of 20 cows were wintered on crop 24 hours a day in the traditional system as a control.

Design of the pad

Site establishment

The site chosen for the location of the pad was on the Invermay deer farm. The site (Figure 2) was chosen for the following attributes:

- Close to cattle yards for animal handling (Figure 2, photo A; cattle yards were in the roofed structure behind the shed)
- It was sheltered
- It was located near the crop paddock for grazing
- It had easy access for earthworks and monitoring (Figure 2, photo B) and a slight slope (4°)
- Pasture paddocks were nearby to apply liquid effluent to
- It had an existing stone trap for effluent collection (this would not be necessary as it is suggested that solids could be scraped up the pad and remain on an area of effluent liner for the winter while the liquids drain out and down the pad for effluent irrigation).

Earthworks were undertaken to remove the pasture and generate a smooth surface as a site for the pad. A pit was dug to house three 3,000 litre tanks to hold gravity-fed liquid effluent (Figure 2, photo C).
Table 1. Advantages and disadvantages of the different surfaces trialled for use as a portable pad surface

<table>
<thead>
<tr>
<th>Surface</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowmax™</td>
<td>• Non slippery</td>
<td>• Needs to be secured in place</td>
</tr>
<tr>
<td></td>
<td>• Easy to roll out</td>
<td>• May require a harder subsurface</td>
</tr>
<tr>
<td></td>
<td>• Takes moisture out of dung.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• &lt;$20 m⁻²</td>
<td></td>
</tr>
<tr>
<td>Rolled rubber</td>
<td>• Easy to unroll</td>
<td>• Too slippery for cows – animal welfare issue – not suitable as a surface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for this purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• $59 m⁻²</td>
</tr>
<tr>
<td>Interlocking matting</td>
<td>• Easy to lock together.</td>
<td>• May require a flat surface</td>
</tr>
<tr>
<td></td>
<td>• Locks become more secure with cow traffic.</td>
<td>• $85 m⁻²</td>
</tr>
<tr>
<td></td>
<td>• Liquid flows through cracks to sublayer</td>
<td>• Questions about slipperiness in heavy rain</td>
</tr>
</tbody>
</table>

Source: (Chrystal et al. 2016)
Figure 1. Photos of initial pad trial. A. pad layout with impermeable liner and 3 surfaces (Cowmax™ is on the left), B. Kura matting, C. rolled rubber, D. impermeable liner, E. bunding of sides, F. final pad, G. cows on matting, H. cows on Cowmax™
Figure 2. Photos of pad establishment for the Experiment II. A. the site prior to pad establishment, B. creating a base for the pad, C. the pit dug to house storage for the liquid effluent, D. existing stone trap.

Pad products and design

An effluent liner (from Polythene and P.V.C. Products Ltd, Gore; www.polythenepvc.co.nz) was used as the impermeable base. The liner was 1mm thick and was overlain with Cowmax™ which came in 4 m wide strips which were glued together on site using Ados F2, a high performance general purpose contact adhesive.

The plastic liner was laid in one piece and secured over wooden deer fence posts used to create a bund around the two longer sides of the pad. A ‘V’ was created to channel the effluent into the stone trap collection area. The plastic was nailed to the posts. The Cowmax™ was laid in three strips, vertically down the pad, with c. 30 cm overlapping sections glued together. The

Notes:
edges of the Cowmax™ were nailed over the deer posts used to bund the pad. A three strand electric fence was used around the pad to keep the cows on the carpet area (Figure 3). The top side of the pad had electric gate wires to allow cows to move on and off the pad. A section of Kura matting (www.numat.co.nz) was laid over the top of the pad where the entrance area was.

![Figure 3. Pad showing side bunding and electric fence (Kura matting is shown stacked on the left of the photo).](image)

Each cow had an allowance of 8.5 m² lying surface on the pad (this required a total of 9 m² cow⁻¹ of geotextile to be purchased to account for the edges of the pad). This is larger than the industry recommendation of 5 m² for an on/off use of a stand-off pad where cows are held more than 12 hours day⁻¹ (DairyNZ 2014) but fits with the industry recommendation of 6 – 11 m² cow⁻¹ for a loose housed barn system with or without grazing (DairyNZ 2015). A water trough was located in one corner (Figure 3) of the pad and a bale feeder was positioned in the centre of the pad. Liquid effluent was stored in three 3,000 litre tanks (Figure 2.C) as the effluent system had not been tested at that stage and it was decided that some storage was required in case the effluent system failed.

**Management of the pad**

The pad was scraped daily using a commercially available ATV mounted scraper (‘de CRAP it®'; http://newmanengineering.co.nz/products/de-crap-it; Figure 4). Cows were released from the pad onto a new crop break at 9 am. At this time the effluent pump was turned on to pump the liquid effluent from the storage tank to pasture on a neighbouring paddock using a low rate, low depth irrigation system. While the tank was emptying the pad was scraped to the stone trap before being removed by tractor to a concrete storage pad. This cleaning procedure
took approximately 20 minutes. The cows remained on their crop break for 6 hours before returning to the pad. Silage was fed *ad lib* on the pad.

![Image](image.jpg)

**Figure 4.** De CRAP It® scraper used to scrape solid effluent from the pad

Key to the success of the concept of the pad is the ability of the impermeable layer to successfully capture effluent deposited on the surface. In both experiments, solid effluent was scraped from the surface (by hand scrapers on the initial pad and a bike mounted scraper in the second stage). This required a collection and storage area for the scraped solids. The amount of solid effluent collected in the second experiment was 25 kg cow⁻¹ day⁻¹. This solid material had a component of the baleage that was fed on the pad.

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Notes:
**Experiment III - Low rate, low depth effluent irrigation**

In addition to daily scraping of solid effluent, the pad will generate liquid effluent that requires management. One option is to put it in the existing effluent pond. However this is not an option if the pad is located far away from the effluent pond (although there may be some scope to use a tanker) and it would increase the volume of storage required. Another option is to store the liquid effluent near the pad and use an existing travelling irrigator (if practicable) to apply it according to the common protocols (when soil water deficit exceeds application depth). With wet and cool conditions in winter, soil water deficits rarely exceed the minimum application depths (8-12 mm) achievable by travelling irrigators and large storage volumes are therefore required. We therefore needed a new approach. A concept of applying liquid effluent to pasture during winter using low rate and low depth (LRLD) spray applications was investigated.

A field experiment was established to compare fluxes of contaminants in drainage and overland flow from a LRLD treatment, whereby small depths of effluent were frequently applied throughout winter, even when soils were relatively wet. We compared this management approach with standard practice (SP) whereby effluent collected during winter was applied during the milking season (September to May) at comparatively greater depths (i.e. 10-15 mm per event) when there was sufficient soil water deficit in the soil. The later approach aligns with industry accepted ‘good management practice’.

We hypothesised that the LRLD approach would reduce winter effluent storage requirements, and thus avoid much of the cost of building or retrofitting existing effluent systems, when installing off-paddock facilities. It would also provide an option for applying effluent to land on occasions when effluent ponds are full, as sometimes happens following prolonged periods of wet weather during spring.

Over the two years of the trial, an average of 90 kg N/ha and 12 kg P/ha was applied to LRLD plots during winter while the control plots received a similar nutrient loading that was instead applied during summer.

**Table 2.** Total seasonal and annual per hectare losses of N and P (kg/ha) in runoff from hydraulically-isolated plots (mean across 2 years) of standard practice (SP) plots and low rate low depth winter applied plots (LRLD). Values for contaminant fluxes are a combination of surface and subsurface drainage.

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Winter flux</th>
<th>Annual flux</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SP</td>
<td>LRLD</td>
<td>Sig.</td>
</tr>
<tr>
<td>N</td>
<td>15.4</td>
<td>30.2</td>
<td>*</td>
</tr>
<tr>
<td>P</td>
<td>0.46</td>
<td>0.46</td>
<td>N.S.</td>
</tr>
</tbody>
</table>
During the winters of years 1 and 2, total fluxes of N in subsurface and surface flows were significantly (P<0.05) greater from the LRLD treatment compared to the SP treatment, where no effluent had been applied (Table 2). In contrast, fluxes of total P during the same period were not significantly (P>0.05) different between treatments. Fluxes of N and P were significantly lower in winter of year 2 compared with year 1, for both treatments (not shown). Annual fluxes of N and P were not significantly different between treatments in year 1 of the experiment, despite the greater winter losses recorded for the LRLD treatment. The N flux in year 2 (not shown) was significantly (P<0.05) higher from the LRLD plots with an additional 4 kg N / ha being lost compared with control plots only. Despite this, there were no significant differences in the total cumulative fluxes of N and P between treatments over the two-year experimental period.

The conclusion from the field experiment results was that the LRLD winter application of effluent led to a greater quantity of N lost to water during winter. Losses of P were not affected by effluent management. While the timing of losses did shift, with greater losses observed for late winter and spring drainage in the LRLD treatment compared to autumn in the SP treatment there was no difference in total annual losses. Under the management protocol developed here, there is limited evidence of adverse effects of LRLD, particularly when compared with the considerably greater contaminant fluxes associated with alternative winter grazing practices such as forage crops.

Following the field experiment, the Agricultural Production System SIMulator (APSIM; Holzworth et al. (2014)) version 7.7 r3615) was used to simulate low rate and low depth (LRLD) effluent irrigation to pasture on seven Southland soil types (consisting of a stony soil, sandy stony soil, and 5 variations of heavy soils) and three different rainfall regimes (high-1082 mm; medium-908 mm; and low-701 mm annual rainfall) over 11 years. Results showed that soil type has the greatest effect on the amount of N leached (Table 3). Stony soils leached significantly more N than heavy soils. The rainfall regime also had a significant effect on the nitrate load in drainage, with greater rainfall resulting in greater N leaching across all soil types. However, the impact of increased rainfall was much greater on the two stony soils than the other soils modelled.

---

Notes:
Table 3. APSIM model outputs of N leaching losses and percentage losses of N applied for daily applications of pad effluent to land over winter. Average values are over 10 years. Results of one heavy soil and two stony soils are shown.

<table>
<thead>
<tr>
<th>Soil</th>
<th>Rainfall</th>
<th>Average N leaching (kg N ha(^{-1}) year(^{-1}))</th>
<th>Average % of N applied lost in drainage</th>
<th>Area required for 100 cows (ha)</th>
<th>Total N load (kg N ha(^{-1}) year(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy soils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pukemutu</td>
<td>Low</td>
<td>0.3</td>
<td>1.0</td>
<td>5.6</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Med</td>
<td>0.5</td>
<td>1.5</td>
<td>4.2</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>1.4</td>
<td>3.3</td>
<td>4.8</td>
<td>83</td>
</tr>
<tr>
<td>Stony soils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otama</td>
<td>Low</td>
<td>5.8</td>
<td>4.5</td>
<td>5.6</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Med</td>
<td>5.3</td>
<td>5.6</td>
<td>4.2</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>10.5</td>
<td>8.9</td>
<td>4.8</td>
<td>83</td>
</tr>
<tr>
<td>Gore</td>
<td>Low</td>
<td>11.5</td>
<td>7.3</td>
<td>5.6</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Med</td>
<td>11.6</td>
<td>8.4</td>
<td>4.2</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>18.1</td>
<td>12.3</td>
<td>4.8</td>
<td>83</td>
</tr>
</tbody>
</table>

The modelling suggests that the N leaching on a heavier soil type, resulting from the LRLD irrigation of effluent (at a load of no more than 102 kg N ha\(^{-1}\) year\(^{-1}\)), was under 2 kg N ha\(^{-1}\) year\(^{-1}\) even in a high rainfall region (Table 3). The maximum area required to apply the effluent captured from 100 cows would be less than 5 ha if the maximum N application rate is restricted to 80 kg N ha\(^{-1}\) year\(^{-1}\). For a range of soil/climate combinations, the Overseer® Nutrient Budgets model (v 6.2.2; Wheeler et al 2003; hereafter called Overseer) and experimental results were used to compare average annual N leaching rates from farms with one of the three different wintering systems: traditional grazing of a brassica crop, grazing of a brassica crop with standoff on a pad and fully housed. In general, the modelled losses (whole farm losses including support blocks and young stock) from the pad systems (13 to 35 kg N ha\(^{-1}\)) were the same as those from scenarios where wintering barns were modelled (13 to 35 kg N ha\(^{-1}\)) and both were smaller than the corresponding losses from traditional systems (15 to 40 kg N ha\(^{-1}\); Figure 5).

Costing of pad technology

Estimates of the cost per cow of the pad technology using the Cowmax™ carpet are $454 cow\(^{-1}\) or $80 cow\(^{-1}\) year\(^{-1}\) when annualised (Table 4). This includes the cost of emptying the solids pit annually. These costs take into account a lying area per cow of 8.5 m\(^2\) and the inclusion of a lined pit for solids storage. This compares to an analysis conducted investigating the cost of 14 barns in New Zealand ranging in per cow cost (of barn and associated effluent
management and machinery) from $934 for a Redpath barn to $5,788 for a free-stall barn (Journeaux & Newman 2015).

**Table 4.** Cost of cow wintering pad technology (assume 9 m$^2$ cow$^{-1}$, including 8.5 m$^2$ cow$^{-1}$ for lying area and 0.5 m$^2$ cow$^{-1}$ for bunding)

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost per cow ($)</th>
<th>Life Expectancy (years)</th>
<th>Annualised cost ($ cow$^{-1}$ year$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic liner</td>
<td>54</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Cowmax carpet</td>
<td>177</td>
<td>8</td>
<td>22.1</td>
</tr>
<tr>
<td>Solids pit liner</td>
<td>12</td>
<td>3</td>
<td>4</td>
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<tr>
<td>K-line</td>
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<td>15</td>
<td>0.5</td>
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<tr>
<td>Pump</td>
<td>20</td>
<td>15</td>
<td>1.3</td>
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<tr>
<td>Water trough</td>
<td>30</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Earthworks</td>
<td>20</td>
<td>5</td>
<td>4</td>
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<tr>
<td>Solids pit effluent removal</td>
<td>20</td>
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<td>20</td>
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<td>Pad surface scraper</td>
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<td>10</td>
<td>1.4</td>
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<td>74</td>
<td>10</td>
<td>7.4</td>
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<td>Bale feeder</td>
<td>6</td>
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<td>0.3</td>
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<tr>
<td>Effluent storage tank</td>
<td>20</td>
<td>20</td>
<td>1</td>
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<tr>
<td>TOTAL</td>
<td><strong>454</strong></td>
<td></td>
<td><strong>80.7</strong></td>
</tr>
</tbody>
</table>

A.

![Graph showing nitrate leaching](image)

Notes:
Figure 5. Whole farm (total 212 ha) system N leaching losses for the crop, pad and barn wintering scenarios. Results are presented for a heavy soil (Pukemutu with mole and tile drainage) and a stony soil type under low rainfall (717 mm yr\(^{-1}\); A) and high rainfalls (1156 mm yr\(^{-1}\); B).

**Areas for further research and development**

Suggested improvements and areas requiring further development and research are:

1. Tensioning the cow comfort layer to reduce bunching of the fabric (Figure 6)
2. Feeding supplementary feeds on the paddock and not the pad
3. Implementation of the pad concept at a greater scale e.g. 100 cows
4. Refining the LRLD system of winter applied liquid effluent and incorporating it with the use of a pad.

**For the pad to be successful, it requires:**

- 8.5 m\(^2\) cow\(^{-1}\)
- Site preparation to reduce the risk of puncturing the liner
- Bunding of the edges of the pad to capture the effluent
- A successful effluent capture system and either storage or suitable method for the safe return to land
- Limiting the capacity of one pad to around 100 cows
- Stock water
- The longevity of the Cowmax\textsuperscript{TM} carpet to be confirmed.
Acknowledgements

This work was funded by AgResearch PreSeed funding. Thanks to Karl White (Invermay Farm Manager) and Lachie Ashton for their valuable advice and assistance with the design and establishment of both pads.

References


Future proof your farm for the folks who’ll run it next.

After having a chat with Te Awamutu farmer Kevin Ferris, who was dealing with some unexpected costs, we developed the Rural Environmental Compliance Loan. It’s a low interest loan to keep your farm up to scratch for the next generation.

We’re always thinking farming, so call your local ASB Rural Manager on 0800 787 252 to find out more.
W#AT THE SOCI@L?
SOCIAL MEDIA DO’S AND DON’TS

Chelsea Millar
Grass Roots Media

Social media is a very powerful communication tool, both for individuals and businesses. Used well, you can have a really engaged, loving audience. Used poorly and you could be answering some pretty tough questions about the reputable damage you may have caused someone, something, a business or an industry. The last thing anyone wants to do is bring harm to the industry they work in and love, so we’ve found people either ignore social media by claiming a lack of understanding or that it has no use in their life. Those who have embraced it either do it well or use it as a ‘listening’ tool for what’s going on in their community.

With 3.2 million active users a month, how can you ignore the power of positive messaging (which is free) that social media offers? If you’re a business it makes total sense, but sometimes businesses are under resourced and can’t manage their digital presence. For individuals, it’s a simple lack of knowledge which scares them off using it.

Grass Roots Media was developed to help resource and educate those who want to use social media as a tool for business or personal use. We enjoy the power of positive and engaging story-telling, so we’ve developed some tips to help you do the same.

Here’s 11 reasons why you should use it:

1. Positive, proactive communication/story-telling
2. Keep up to date with industry news
3. Engage with your audience to build meaningful relationships
4. Build credibility for you, your operation, your brand
5. It’s an easy way to learn about what interests your audience
6. You can use it to target and expand your audience
7. Educate and excite people about the dairy industry
8. Allows you to receive instant feedback on a topic
9. Share honest, truthful, positive stories easier and faster

Notes:
10. Influence consumer behaviour
11. You’re in control of the messaging.

Being able to positively communicate your messages, truthfully and transparently is really the key to mastering social media. DairyNZ have produced a great Social Media 101 guide for dairy farmers. Jump on to their website and download a copy if you’re keen to harness the power social media offers you.

If there is one final piece of advice I’d give you it’s around sharing photos. Make sure you check the background, foreground and the object your snapping for any incriminating evidence. The last thing you want to do is take a photo of the head of your Jersey only to find out once you’ve posted your photo you’ve got a cow being mounted by a Bull in the background. There could be worse photo bombs!

7 things you need to know

BEFORE YOU GET SOCIAL

Think before you post

Ask yourself ‘How will those less educated about my business and industry react?’

What tone will you use?
Your voice online is crucial!

Monitor your social media presence daily - even weekends

Be consistent

Know the risks
Be ready for negative feedback

Don’t argue - you’re not a keyboard warrior
ACHIEVING THE REQUIRED N LEACHING REDUCTIONS – REDUCING N LEACHING IN REAL LIFE

Ina Pinxterhuis\textsuperscript{1}, Tony Coltman\textsuperscript{2}, Paul Edwards\textsuperscript{1}, Leighton Parker\textsuperscript{3}
\textsuperscript{1} DairyNZ, Lincoln
\textsuperscript{2} Canlac Holdings, Dunsandel
\textsuperscript{3} Perrin Ag Consultants Ltd, Rotorua

Key messages

• Several New Zealand catchments will need to reduce agricultural nutrient loss to improve water quality. For dairy milking platforms in the Selwyn/Te Waihora catchment, this means a 30\% reduction in nitrogen (N) loss to water from their baseline good management practice N loss rate (2009-2013).

• Options to reduce N leaching include: more efficient use of water, fertiliser and effluent; using low-N supplements; and reducing cow numbers in autumn. These reduce the amount of surplus N in the farm system and N deposited on pasture when plant N uptake is low and risk of drainage is increasing.

• Each farm has constraints and requires its own reduction strategies to achieve nutrient obligations. This paper shows that options are available to improve the efficiency of N use while retaining a highly profitable system.

Responding to water quality policy in Canterbury

Many farms in Canterbury are facing the challenge of reducing their nitrogen (N) loss to well below their current level. N loss to water is mostly N leaching from urine patches in grazed dairy systems, but also includes N leached from areas between urine patches, N loss from run-off and direct deposit of dung or urine into waterways, if these are accessible by animals. N leaching is defined as all N drained to below 60 cm soil depth, assumed to be the root zone. Poor irrigation management contributes to drainage and over-application of N from fertiliser and effluent (e.g. when not adjusting fertiliser applications to compensate for the N applied in effluent) increases the risk of N leaching.

Notes:
Environment Canterbury, and regional zone committees, have developed policies in response to the National Policy Statement for Freshwater Management (updated in 2014; Ministry for Environment 2014), with the policy for the Selwyn/Te Waihora catchment (Environment Canterbury 2014) made operative from February 2016. This policy requires all farms to be implementing good management practices (GMP) by June 2017, as defined by six industries (dairy, sheep and beef, deer, arable, horticulture and outdoor pork) in the Matrix of Good Management Project (2015). Dairy farms that have an estimated N loss of more than 15 kg N/ha/yr must reduce losses by 2022, by 30% (dairy milking platform) and 22% (dairy support) of the Good Management Practice Nitrogen and Phosphorus Loss Rates for the property’s baseline land use (i.e. 2009-2013). From 2037 no farm will be permitted to leach more than 80 kg N/ha/yr.

To enable dairy farmers achieve these requirements, farmers will need to know their baseline Good Management Practice Nitrogen Loss Rate, as estimated with a nutrient budgeting tool (usually OVERSEER®; Wheeler et al. 2011; www.overseer.co.nz; Oversee hereafter). Next, they need to know options that reduce N loss to meet their target, and decide which are appropriate for their farm. Finally, they must implement the chosen options successfully. This requires a strong commitment from the farmers. A strong industry effort is also essential, to make information available, to develop new practical and cost-effective options, and to help build suitable support for farmers.

**Options to reduce N leaching**

Two large research programmes are investigating options to reduce N leaching from agricultural farming systems: Pastoral 21 (P21) and Forages for Reduced Nitrate Leaching (FRNL). See https://www.dairynz.co.nz/publications/technical-series/technical-series-october-2014/ for summaries. P21 has conducted four dairy farmlet studies across New Zealand: Waikato, Manawatu, Canterbury and Otago (Shepherd et al. 2017). Regionally applicable farm systems were compared, one reflecting current practice and others that implemented practices predicted to reduce N leaching significantly: reduced fertiliser and supplement N input, reduced stocking rate, and standing cows off pasture from several hours per day to all day during wet conditions or in autumn/winter.

FRNL aims to find pasture plants and forage crops that reduce the surplus N intake of animals, reduce or alter urinary N excretion, and increase plant N uptake from the soil, e.g. through deeper rooting or cool season growth (Pinxterhuis et al. 2015). New Zealand’s standard perennial ryegrass-white clover pastures contain more protein than grazing animals require, and the surplus N is excreted, mainly via urine. The urine patch, in turn, contains levels of N which are higher than pasture plants can take up. The remainder is at risk of draining below the root zone and ending up in ground and surface water.
While some novel options to reduce N leaching are not yet considered by Overseer (e.g. combinations of pasture species), key water and nutrient management principles confirmed in P21 farmlet trials and FRNL experiments are well researched and reflected in Overseer:

- Apply irrigation efficiently by monitoring soil moisture and taking account of the weather forecast and soil water holding capacity. This increases herbage production and plant N uptake, while managing the risk of N leaching, i.e. loss of water containing dissolved nutrients below the root zone.
- Reduce N inputs by applying fertiliser and effluent only when plants are able to utilise the applied nutrients well (e.g. not during drought, high rainfall or low temperatures). This reduces the amount of N cycling in the farm system and the surplus N in the soil that is at risk of leaching.
- Use supplements with relatively low N content. This reduces the animals’ N intake and hence N excreted in urine.
- Stand cows off pasture in wet or cold periods when pasture growth is low. This avoids depositing urine on the soil when risk of drainage is high or plant N uptake is less, and gives the opportunity to spread effluent on crop or pasture at times of the year when plants are growing and utilising the nutrients applied.

**Commercial farms collaborating with research**

FRNL includes a network of monitor farms in Canterbury: four dairy farms, two mixed livestock farms, two arable farms and one mixed arable-dairy farm. The farmers monitor their management in detail. Daily activities are recorded in a purpose-built spreadsheet and data are summarised to support management, e.g. a feed wedge to optimise pasture utilisation, and monthly reports of inputs and production to keep track of input efficiency. The monitor farmers work with researchers and consultants to develop nutrient budgets and farm system models for their farm, and to develop modelling scenarios which are tested for their potential to reduce N leaching and improve profitability. Ultimately, promising scenarios are tested in practice.

This paper reports on one modelling exercise where an FRNL dairy monitor farm in the Selwyn catchment was modelled with Overseer and Farmax (a physical and financial farm model).
system model; www.farmax.co.nz). Scenarios to achieve the future N loss requirements were developed using the principles outlined above, and tested in the models for impact on N leaching, production and profitability.

**Canlac Holdings – farm performance in 2015-2016 season**

Canlac Holdings is located 5 km west of Dunsandel in the Selwyn catchment. Since 2013 the dairy farm has been operated by Tony Coltman and Dana Carver, 50:50 sharemilkers with an equity interest. Canlac Holdings is a top-performing business through maximising production and utilisation of pasture, effectively converting imported feed into milk and keeping a tight control of costs. The farm’s vision is:

“To be a leader in the dairy industry in all areas by excelling with top 5% production, top 5% financial returns, and aesthetically well-presented farm, all environmental standards exceeded and happy, healthy staff”.

The farm comprises a 348.5 ha milking platform (335 ha effective) and a 155 ha leased support block. The water quality regulation is the land owners’ responsibility, so we will focus on the milking platform in this paper.

Most of the milking platform comprises a well-draining Lismore soil (Lism_1a.1; S-map https://smap.landcareresearch.co.nz) and 43 ha is a moderately well-draining Mayfield soil (Mayf_2a.1).

In 2013 some rotorainers were replaced by a second pivot, resulting in 82% of the farm being irrigated by two large pivots. The remainder is irrigated by two rotorainers (9% of the area) and sprinklers (the remaining 9% of the area). In 2013 the effluent irrigation area was increased from 21% to 41% of the milking platform (effective hectares).

In the 2015-2016 season, stocking rate was 4.2 cows per effective ha, milking 1390 cows at peak. Average liveweight per cow was 491 kg. Milk solids (MS) production was 502 kg MS/cow or 2,087 kg MS/ha. The spring-calving Friesian-cross herd had a BW of 141/47 and PW of 178/64.

The comparative stocking rate was 84 kg liveweight/t DM feed and the feed conversion efficiency was 85 g MS/kg DM. Pasture management was optimised for high production and utilisation. Weekly farm walks, the use of a feed wedge, a rotation length to maximise pasture growth and quality, timely irrigation and effective use of a relatively high level of N fertiliser increased pasture eaten from 15.7 t DM/ha in 2013-2014 to 18.5 t DM/ha in 2015-2016. In the 2015-2016 season a feed pad was built to optimise utilisation of purchased feeds, 3.0 t DM/ha supplements. External grazing supplied another 3.2 t DM/ha.

Total farm working expenses were $3.50/kg MS, including feed costs of $1.52. Due to the low milk price, more emphasis was put on increasing livestock income in the past two seasons. Beef bulls were used for late calvers, and this increased the return from calves from...
$20-30 per bobby calf to $100-200 per four-day old dairy/beef cross calf. Also, the price for cull cows was higher in the last years. This resulted in an increase of livestock income from $0.34/kg MS in 2013-2014 to $0.55/kg MS in 2015-2016.

**Modelling good management practice**

Overseer (version 6.2.3) nutrient budgets were prepared for the 2009-2010 to 2015-2016 seasons. The first four years, i.e. 2009-2010 to 2012-2013, are considered the farm’s nitrogen baseline (Environment Canterbury 2014). The average N leaching for these years was 76 kg N/ha/yr (Figure 1).

![Graph showing N leaching and baseline comparison](image)

**Figure 1.** Overseer estimated N leaching for the milking platform of Canlac Holdings. Nitrogen baseline is the average of the 2009-2010 to 2012-2013 years.

Improvements in irrigation and enlargement of the effluent area in 2013 reduced N leaching to 62 kg N/ha. However, the N surplus increased due to intensification (more N fertiliser used and more supplements imported, and consequently more cows/ha), from an average of 157 kg N/ha/yr in the baseline period to 220 kg N/ha in 2015-2016. The N surplus is the amount of N input that is not converted to products. In this paper we use a simple

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**Notes:**

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calculation: [N in fertiliser and supplements] minus [N in products as milk, meat and crop sold off farm]. This surplus N is at risk of loss through leaching, ammonia volatilisation and gaseous loss, e.g. nitrous oxide, a potent greenhouse gas. It should be noted that Overseer’s N surplus calculation includes an estimate of clover N fixation in pasture as input and will, therefore, be higher than our simplified calculation. We exclude N fixation because it is difficult to measure at farm scale and several assumptions need to be made to calculate this. Information on N input from fertiliser and supplements, however, is normally available for each farm.

The Selwyn/Te Waihora Zone sub-regional regulation requires farms to operate at or below their baseline N loss at GMP from 2017-2018. We translated GMP into modelling rules for Overseer:

- No N fertiliser applications in the months of May, June and July
- No more than 50 kg N/ha applied per month on pasture blocks
- No more than 400 kg N/ha applied per annum from fertiliser and effluent on pasture blocks
- Total N/ha applied on effluent block does not exceed the average N applied on non-effluent blocks
- Less water applied in shoulders of the season (September, October and March) than in summer (November to February). Overseer adjusts the amount of water applied to rainfall when irrigation scheduling is based on soil water budget or soil moisture sensors. But if a fixed depth and return rate is used, these should be altered in the shoulders of the season to avoid over-application of water
- Have less than three months fallow after cropping. If not, use a catch crop in between the main crops, e.g. an annual grass or (winter) cereal crop.

Applying these rules to the nitrogen baseline Overseer files reduced the average N loss from 76 kg N/ha to 71 kg N/ha. The milking platform is currently operating below this baseline.

**Farm system and management changes to reduce N leaching**

From 2022, milking platforms need to be operated at 30% below their GMP baseline. This means Canlac has to reduce N loss to 50 kg N/ha for the milking platform.

Two scenarios were modelled:

1. Reduce the number of cows in autumn by culling 90% of the non-pregnant cows and cull cows early (1 April)
2. Reduce the overall number of cows by 50 and maintain the current culling strategy.

Both scenarios reduced N fertiliser use from 290 kg N/ha to 215 kg N/ha on average (235 kg N/ha on the non-effluent areas and 205 kg N/ha on the effluent areas) and reduced the amount of N fertiliser in April. Through re-nozzling, water application by the rotorainers was
reduced from 35 to 30mm every 6 days (5 mm/day) and a bucket test carried out to confirm this target. The amount of imported N in feed was reduced by buying maize silage and using some fodder beet on the feed-pad instead of some of the pasture silage and PKE. The proportion of low-N imported feed was increased from 8% to 52%. In all cases a feed pad was in use.

Table 1 summarises the modelling results. The scenario with early culling achieved an N loss below the target of 50 kg N/ha. The scenario with reduced stock numbers by 50 cows throughout the year did not. This illustrates that Overseer responds strongly to cow numbers and feed eaten in autumn, reflecting the relatively high risk of N leaching from urine patches deposited in autumn, when plant growth and associated N uptake is slowing down and risk of drainage is increasing in the months ahead.
Table 1. Summary of results of modelling scenarios to reduce N leaching for Canlac. Current = modelled current system (2015-2016); Scenario 1 = early cull; Scenario 2 = 50 fewer cows at peak. See text for full explanation of scenarios.

<table>
<thead>
<tr>
<th>Physical Indicators</th>
<th>Current</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy farm total area (ha)</td>
<td>346</td>
<td>346</td>
<td>346</td>
</tr>
<tr>
<td>Effective area (ha)</td>
<td>335</td>
<td>335</td>
<td>335</td>
</tr>
<tr>
<td>Cows wintered</td>
<td>1,484</td>
<td>1,474</td>
<td>1,432</td>
</tr>
<tr>
<td>Peak cows milked</td>
<td>1,410</td>
<td>1,400</td>
<td>1,360</td>
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<tr>
<td>Stocking rate (cows/ha)</td>
<td>4.21</td>
<td>4.18</td>
<td>4.06</td>
</tr>
<tr>
<td>Production (kg MS)</td>
<td>698,031</td>
<td>671,083</td>
<td>671,455</td>
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<tr>
<td>– per hectare (kg MS/ha)</td>
<td>2,084</td>
<td>2,003</td>
<td>2,004</td>
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<tr>
<td>– per cow (kg MS/cow)</td>
<td>495</td>
<td>479</td>
<td>494</td>
</tr>
<tr>
<td>Pasture Eaten (t DM/ha)</td>
<td>18.5</td>
<td>18.0</td>
<td>18.0</td>
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<tr>
<td>N Fertiliser applied (kg N/ha)</td>
<td>290</td>
<td>215</td>
<td>215</td>
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<tr>
<td>Purchased feed (t DM)</td>
<td>1,032</td>
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<td>Grass silage</td>
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<td>Maize silage</td>
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<td>PKE</td>
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<tr>
<td>Fodder beet bulb</td>
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<td>63</td>
<td>55</td>
</tr>
<tr>
<td>– per hectare (t DM/ha)</td>
<td>3.1</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>– per cow (t DM/cow)</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Winter crop (t DM/ha)</td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Financial Indicators

| Total income ($)               | 4,600,051   | 4,435,479  | 4,425,725  |
| Total operating expenses       | 2,731,438   | 2,668,188  | 2,654,003  |
| – $/kg MS                      | 3.91        | 3.98       | 3.95       |
| Total operating profit         | 1,868,613   | 1,767,291  | 1,771,722  |
| – $/ha                         | 5,578       | 5,275      | 5,289      |
| Change in profit ($)           | -101,322    | -96,890    | -96,890    |

Environmental Indicators

| Total N leached (kg N/yr)      | 21,076      | 16,995     | 18,368     |
| N leached (kg N/ha/yr)        | 61          | 49         | 53         |
| N surplus (kg N/ha/yr)¹       | 215         | 126        | 122        |
| N conversion efficiency (%)¹  | 39          | 52         | 53         |
| kg MS/kg N surplus            | 9.7         | 15.9       | 16.4       |
| Operating profit $/kg N surplus| 25.94       | 41.87      | 43.35      |

¹ Excludes N fixation as input; see text for explanation.

Both Scenario 1 and Scenario 2 reduced farm profit by 5% from Current, using a milk price of $6.00. This was due to 4% lower milk production from less pasture eaten (due to less N fertiliser applied), less PKE, and a 1-2% increase in costs (mostly feed).
Nitrogen efficiency parameters for the scenarios reflected the reduced amount of N brought onto the farm: the N surplus was reduced by 11-13% and the N conversion efficiency was improved by 3%.

Eco-efficiency is a measure of how much is produced per unit of environmental impact, e.g. kg MS produced per kg N surplus. Eco-efficiency can also be monetary, e.g. operating profit $ per kg surplus. Both measures were improved considerably in the scenarios: kg MS/kg N surplus increased by 64-69% and operating profit $/kg N surplus increased by 61-67%.

**Benchmarking environmental performance**

Actual and modelled N leaching for the current Canlac system are similar to the 64 kg N/ha estimated average for Canterbury dairy milking platforms (DCANZ and DairyNZ 2017). However, N leaching varies widely in Canterbury due to differences in soil type and climate. Therefore, to assess nutrient management it is more useful to compare N surplus and N conversion efficiency (NCE) with relevant published data.

For the Matrix of Good Management project in Canterbury, a large dairy dataset derived from Ravensdown’s 2013/14 nutrient budgets was used. The average N surplus (excluding N fixation) for this dataset was 146 kg N/ha and NCE was 48% (Pinxterhuis et al. 2015b). The relatively high input Canlac system resulted in a higher N surplus and lower NCE than the averages of this dataset. The two scenarios resulted in better N surplus and NCE than the averages of the dataset.

Table 2 provides the key environmental results of two dairy systems implemented in the Pastoral 21 farmlet study in Canterbury (Chapman et al. 2017). These systems can be considered very well-managed with maximum pasture production and utilisation, and efficient use of fertiliser and supplements. The stocking rate, MS production/ha, fertiliser use and supplement imported (‘intensity’) of Canlac’s current system was closer to the P21 Higher-Input system than the Lower-Input system. The N surplus was lower and the NCE higher than the P21 Higher-Input system; N leaching was higher for Canlac due to the more freely draining soil type than the Templeton sandy loam of the P21 farmlets.
The two scenarios for Canlac show a significant improvement in N surplus, NCE and eco-efficiency (kg MS or operating profit per kg N surplus), but they do not achieve the efficiency of the P21 Lower-Input system. The P21 Lower-Input system operated at a considerably lower N input than Canlac’s current and potential systems and the P21 Higher-Input system, resulting in a much lower N surplus and higher NCE, higher eco-efficiency and lower N leaching. While profitability of the P21 Lower-Input system was still high, production at the farm level was lower. However, at catchment or regional level, production may not be reduced if the high input systems source their supplements locally and all hectares are counted, i.e. including the hectares where the supplements and replacement stock are grown and non-lactating cows are wintered (Chapman et al. 2017).

Table 2. N surplus and NCE (excluding N fixation) from well-managed dairy milking platforms of Canterbury Pastoral 21 farmlets (calculated from data in Chapman et al. 2017). Lower-Input = 3.5 cows/ha, 509 kg MS/cow and 1,782 kg MS/ha, 154 kg N fertiliser/ha, 70 kg DM cereal grain/cow and $4,302 operating profit/ha\(^1\); Higher-Input = 5.0 cows/ha, 476 kg MS/cow and 2,378 kg MS/ha, 309 kg N fertiliser/ha, 680 kg cereal grain/cow and $4,205 operating profit/ha\(^1\).

<table>
<thead>
<tr>
<th>N leaching (kg N/ha)</th>
<th>Lower-Input</th>
<th>Higher-Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>N surplus (kg N/ha)(^1)</td>
<td>32</td>
<td>46</td>
</tr>
<tr>
<td>N conversion efficiency (%)(^1)</td>
<td>57</td>
<td>286</td>
</tr>
<tr>
<td>kg MS/kg N surplus</td>
<td>68</td>
<td>36</td>
</tr>
<tr>
<td>Operating profit $/kg N surplus(^2)</td>
<td>31.3</td>
<td>8.3</td>
</tr>
</tbody>
</table>

\(^{1}\) Excludes N fixation as input; see text for explanation.
\(^{2}\) Operating profit was calculated with a milk price of $6.10/kg MS.

**Conclusion**

The scenario modelling showed that a high-performing dairy farm such as Canlac Holdings has options available to reduce N leaching to the limits set in the catchment’s regulations, i.e. a reduction of 30% from its baseline at good management practice. Major investments by Canlac, in the irrigation system and a feed pad, have already reduced N leaching and improved N efficiency since the baseline years, and, therefore, already contributed to achieving the 30% reduction. Nonetheless, a high profit was still achieved.

The Canterbury Pastoral 21 farmlet study showed that further reductions in N leaching are possible by reducing N inputs and N surplus even further.

**Acknowledgements**

This research was completed with support from New Zealand dairy farmers through DairyNZ and the Forages for Reduced Nitrate Leaching programme with principal funding from the New Zealand Ministry of Business, Innovation and Employment. The programme is a
partnership between DairyNZ, AgResearch, Plant & Food Research, Lincoln University, Foundation for Arable Research and Landcare Research.

References


https://www.dairynz.co.nz/media/5787310/water_accord_summary_3-years_on_web_v2.pdf


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Notes:


HOW NZX MILK PRICE FUTURES AND OPTIONS WORK

Susan Kilsby & Nick Morris
NZX

Introduction

Over the past 50 years the global dairy industry has experienced a transformation, moving from a stable low risk environment to one of unprecedented volatility. The New Zealand dairy farmer is at the forefront of this volatility transformation where 95% of milk is exported and farmers are exposed to the ups and downs of the global market. Both producers and purchasers of milk products are increasingly seeking ways to create certainty around the price they receive or pay for product. Futures and options contracts provide a useful tool for dairy farmers and processors to reduce their risk, and it is now more important than ever to understand how to use these risk management tools.

Risks for NZ dairy farmers

NZ dairy farmers supplied 1.8b kilograms of milk solids (kgMS) in 2016 and 95% of this milk is exported. Unlike many other dairy producing regions in the world that can depend on domestic demand and government subsidies in tough times, the NZ dairy farmer is significantly more exposed to volatility in the global market. As a result, the milk price can move significantly over the course of the season and from year to year (see chart below), affecting the ability of NZ dairy farmers to manage cash flows. Significant movements in the milk price can also affect the ability of some NZ dairy farmers to service debt. The level of debt carried by NZ dairy farmers is approaching $40 billion (Reserve Bank Financial Stability Report, Nov 2015) and is unevenly distributed between farmers. Just 20% of farms hold 48% of total farm debt, compared with 20% of the lowest indebted farms accounting for only 3% of the total debt (DairyNZ based on 2013-14 dairy season). The 20% of farms with the highest debt (NZ$34/kgMS or greater) have an average loan-to-value ratio of 68% and require a milk price of $5.80/kgMS to break even (DairyNZ, Nov 2015).

Notes:
NZ Dairy derivatives market

NZX launched Whole Milk Powder (WMP) Futures in October 2010, followed by Skim Milk Powder (SMP) and Anhydrous Milk Fat (AMF) Futures contracts in February 2011. In November 2011, WMP Options contracts were launched and in December 2014 Butter (BTR) Futures were added to its derivative product offering. In 2016 NZX expanded its dairy offering with the launch of milk price futures and options contracts. Milk price futures and options are currently offered for three seasons. The contract relating to the previous milk production season will expire at the end of September, at which point another contract will be listed, so there will always be at least three contracts available to trade at any time.

How derivatives work

The value of a derivative contract is derived from a physical (“underlying” or “cash”) market. For example, the value of a NZ milk price futures contract is derived from the market value of raw milk.

1. Futures contracts

A futures contract is a contract between a buyer and a seller to make delivery of goods or an asset at an agreed date in the future but at a price agreed today. For example, where the purchaser of a house agrees with the vendor to purchase the property for $500,000 in 6 months’ time, this agreement is in effect a futures contract. A futures exchange allows parties to trade standardised contracts that are, in most cases, cash settled (i.e. no physical delivery of goods).
Futures accounts

When trading a futures contract you do not pay or receive the full value of the trade when the transaction takes place. Instead, a futures contract is backed by a “margin” account, which - similar to a bond or deposit - helps ensure the agreed transaction takes place. Upon entering into a futures position, the holder is required to pay an ‘Initial Margin’ into this account. Throughout the life of a futures contract the holder may also be required to deposit additional payments where the account balance falls below the “maintenance margin”. These concepts are described in more detail below.

2. Options contracts

Options contracts provide the purchaser with the right, but not the obligation, to buy or sell goods or assets at an agreed date in the future at a specific price. For example, a dairy farmer may want to protect against the milk price falling but retain the benefit of potentially higher prices. To achieve this, the farmer would purchase a “put” option (the right to sell). Were prices to decline, the farmer could exercise the put option. If prices were to rise, the farmer could let the options contract expire worthless. This example also demonstrates how options can be used as a form of insurance to protect against downside risk (with a premium being paid to the seller of the contract). There are five key characteristics of options contracts:

Underlying asset

An options contract must be based on an underlying asset or instrument, e.g. a physical good or in many cases a futures contract.

Expiration date

All options contracts will expire on a specified date. For milk price options contracts this is the day on which the underlying futures contract expires.

Type

Being either a call option or a put option.
**Strike or Exercise Price**

This is the agreed price at which the underlying instrument will change hands if the option is exercised.

**Premium**

The price for the option paid by the buyer to the seller. While the above four characteristics are set by an exchange (NZX), the premium is set by market forces (supply and demand).

To understand why parties choose to trade derivatives, it is useful to learn about two categories of traders: hedgers and speculators.

3. **Hedging**

Hedgers, such as processors or producers of dairy products, seek to mitigate risk by creating price certainty. They do so by acquiring the opposite position in the futures market to that which they hold in the physical market. Any losses made in the physical market are theoretically offset by gains in the futures market. Hedging strategies consider that the physical market price and the futures market price tend to move in the same direction, at the same time. This correlation is not perfect however it is usually sufficient to significantly reduce the risk of loss.

4. **Speculating**

Speculators seek to make a profit by predicting market movements. In the futures market, it is just as easy to initiate a trade by selling a futures contract first as it is to buy first. A speculator who thinks prices will rise can buy (go long) dairy futures. Speculators who think prices will fall can sell (short) dairy futures. To close out or offset the initial transaction, they will take the opposite positions (selling contracts they bought, or buying contracts they have sold). Speculation in a derivatives market is vital in bringing liquidity to the market and facilitating trading of those who are wanting to hedge.

**Common terms and definitions**

5. **Basis**

The correlation between physical market prices and futures contract prices is known as the ‘basis’. The actual Farmgate Milk Price and price of the futures contract may not be identical. It is important for traders of futures contracts to be aware that the slight difference in futures and physical prices could slightly reduce the expected profit (or loss) on an overall transaction.
6. **Call and put**

The purchaser of a call option has the right but not the obligation to **buy** a futures contract. The seller of a call option must sell the futures contract should the purchaser exercise their right. The purchaser pays a ‘premium’ for such a right. The opposite is true of put options (i.e. a put option is purchased for the right to sell a futures contract).

7. **Daily settlement**

A trader’s gains and losses with respect to futures contracts are calculated on a daily basis, based on the daily settlement price. This price is determined either by the price of futures traded that day (usually set with reference to last traded price), or a volume weighted calculation involving trading activity late in the day.

8. **Expiration date / Last trading day**

Rights under options contracts can usually be exercised “on or before” an expiration date. Once that date has passed, the options contract is no longer valid (i.e. has expired and any money spent to purchase the option is unable to be recovered).

9. **Final settlement (cash vs. physically delivered)**

Rather than literally delivering the physical product (e.g. milk solids) when a contract settles, most futures contracts are now “cash” settled. It is important to be aware that market participants will often refer to a contract as “going to delivery”, i.e. the contract is still open at the expiry date, even when it is cash settled. NZ milk price futures settle to the Farmgate Milk Price announced by Fonterra every September.

10. **‘In the money’, ‘out of the money’, ‘at the money’**

A call option (right to buy) is ‘in the money’ when its strike price is below the market price of the underlying asset, and ‘out of the money’ when its strike price is above the market price. An option that is ‘out of the money’ at the expiry date will expire worthless. These terms

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Notes:
apply in the opposite direction for a put option (right to sell). For example, a put option is ‘in the money’ when its strike price is above the market price of the underlying asset. An ‘at the money’ option’s strike price is identical to the market price of the underlying security.

11. Long and short

To go long means to buy. In the physical market if you have not yet bought product (agreed a purchase price) you are by definition short.

To go short means to sell. In the physical market if you have not yet sold your product (agreed a sale price) you are by definition long. For example, a dairy farmer will typically be long in the physical market for milk.

These concepts are important in the context of hedging where a hedger acquires an opposite position in the futures market to that which they hold in the physical market.

12. Margin (initial vs. maintenance)

A “margin” account records profits and losses experienced by a futures contract (on a daily basis) as the underlying market fluctuates over the span of the contract.

The initial amount held in a margin account (called “initial margin”) is calculated as a percentage of the futures contract delivery price. A “maintenance margin” represents the lowest amount the account can reach before it must be topped up (back to the initial margin). This is explained in more detail below.

13. Physical / cash / underlying market

The product or asset from which the futures or options contract is derived, e.g. for milk price futures, the product is kg’s of milk solids.

Examples of hedging with futures

14. Short hedge

Dairy farmers can utilise a short hedge to protect against a falling milk price. This would mean selling futures contracts to offset their long position (holding physical milk solids).
Example 1

<table>
<thead>
<tr>
<th>Physical market</th>
<th>Contract to sell milk</th>
<th>Final milk price announced</th>
<th>Earnings from milk sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast price</td>
<td>$6.50</td>
<td>$5.00</td>
<td>$5.00</td>
</tr>
</tbody>
</table>

| Futures market  | Enter contract to SELL futures at $6.50 | Settle contract BUY futures at $5.00 | Profit/loss on futures $1.50 | Total earnings $6.50 |

In May 2017, the first forecast Farmgate Milk Price for the 2017/18 season is announced at $6.50/kgMS. A dairy farmer seeks cash flow certainty by implementing a short hedge.

The farmer reviews the NZX milk price futures order book, which shows that participants are willing to buy up to 50 ‘lots’ of milk solids (one ‘lot’ equates to 6,000 kg’s milk solids) at $6.50/kgMS for the 2017/18 season. The farmer decides to sell 10 lots or the equivalent of 60,000 kgMS at the price offered.

As the season progresses, the milk price falls and the Farmgate Milk Price is announced at $5/kgMS (also being the final settlement price of the futures contracts).

So what has happened? **The loss in the cash / physical market** (the farmer will receive $5/kgMS instead of $6.50/kgMS) has been **offset by the gain in the futures market** (the futures contracts sold in May at $6.50/kgMS are repurchased (or settled) at the Farmgate Milk Price of $5/kgMS).

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As the season progresses, the milk price increases and the Farmgate Milk Price is announced at $8/kgMS (also being the final settlement price of the futures contracts).

So what has happened? **The gain in the cash / physical market** (the farmer will receive $8/kgMS instead of $6.50/kgMS) has been offset by the loss in the futures market (the futures contracts sold in May at $6.50/kgMS are repurchased (or settled) at the Farmgate Milk Price of $8/kgMS).

<table>
<thead>
<tr>
<th>Example 1: Milk price falls</th>
<th>Example 2: Milk price rises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Futures selling price</td>
<td>$6.50</td>
</tr>
<tr>
<td>Final farmgate milk price</td>
<td>$5.00</td>
</tr>
<tr>
<td>Profit/loss on futures contract</td>
<td>+$1.50</td>
</tr>
<tr>
<td>Effective total income ie milk price + futures gain/loss</td>
<td>$6.50</td>
</tr>
</tbody>
</table>

**Examples of trading options**

An option is the right but not the obligation to buy or sell goods or assets at an agreed date in the future at a specific price. Unlike futures, options can be used to protect against a decline in prices while still allowing the option holder to benefit from a rise in prices – the difference being that the buyer of the option must pay the seller a premium.
In the case of NZ milk price options contracts the underlying asset is an NZ milk price futures contract. One can purchase a “call” (the option to buy a futures contract) or purchase a “put” (the option to sell a futures contract).

15. Buying a put (right to sell)

A farmer decides to purchase a put option to protect against the possibility of the milk price falling but still benefit from any rise in the milk price.

In July 2017, the Sep 2018 milk price futures contract (for the 2017/18 season) is trading at $6.50/kgMS. Sep 18 put options are available with a strike price of $6.50/kgMS, for a $0.60 premium.

\textit{Milk price rises - to $8/kg}

If the physical milk price for the 2017/18 season rises to $8/kgMS, a $6.50/kgMS put option will expire worthless. In this instance, the purchaser of the put option would receive a price for their physical milk of $8/kgMS and waive the right to sell on the futures market at $6.50/kgMS. The purchaser will still have to pay the premium however, leading to an effective selling price of $8/kgMS less $0.60/kgMS = $7.40/kgMS.

\textit{Milk price falls – to $5/kg}

If the physical milk price for the 2017/18 season falls below $6.50/kgMS, the put option is “in the money”– it can either be exercised or sold prior to settlement or will be automatically exercised at expiration.

If exercised, the purchaser of the put option will now have a short futures position at a price of $6.50/kg. Futures settle to the Farmgate Milk Price of $5/kg so the farmer will benefit from the gain in the futures contract of $1.50kg (less $0.60/kg premium) creating an effective sales price for milk of $5.90/kg.

Notes:
Information on margin accounts and trading

Initial margin

Initial margin for NZX Dairy Futures is generally between 5-15% of the value of the traded contract. This margin acts as a good faith bond that will be used if the holder of the account fails to meet any obligations. If all obligations are met, then the initial margin is returned in full once the dairy futures position is closed. To find out more about current initial margin rates, visit this link: [www.nzclearingcorp.com/risk-management](http://www.nzclearingcorp.com/risk-management)

Variation margin

In addition to the initial margin required to open a futures position, the holder of a futures contract may be required to deposit additional payments into the margin account in the event of adverse price movements in the market. The additional payments represent a “variation margin”. A margin call is required if the price moves so much so that the balance of the holder’s margin account falls below a set minimum margin.

Example

A futures contract has an initial margin requirement of $4,000 and a maintenance margin of $3,600. If the daily settlement price (based on futures trading for that day) falls by $420 from Day 1 to Day 2, the account balance has fallen below $3,600 (i.e. $4,000 - $420 = $3,580) and would initiate a margin call. The holder in this case would be obligated to deposit funds into the margin account so as to re-establish the account balance to $4,000. Failure to meet a margin call will incur fees and potential disciplinary action.

How to get started

1. **Develop a hedging strategy**

   It is important that you understand your objectives, the different products on offer and in particular the trading fees, charges and margins. You can do so by seeking advice from an NZX Derivatives Participant (broker) or independent advisor.

2. **Open an account with a broker**

   This requires you to provide basic company information, fund the account and impose trading limits.

3. **Start trading**

   This can be done over the phone with your broker.
Additional information

Brokers and advisers of the NZX milk price contracts (as at May 2017) are as follows:

4. Brokers

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henry.lin@pegasusconsulting.co.nz

To view the latest list of NZX Derivatives Participants (brokers), visit the link below:
http://www.nzxfutures.com/access.

Notes:
For more information on the NZX Dairy Derivatives market, please call Nick Morris on +64 (9) 3083703 or email: nzxderivatives@nzx.com. For more information about AgriHQ contact Susan Kilsby +64 272962894 or susan.kilsby@nzx.com.
A UNIQUE SET OF ICONOGRAPHY THAT HAS
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SHIPPING
TANKER
PROCESSING
A CLOSER
BOTTLE
FORMULA
GLASS
GRASS
CARTON
DRUM
CAN
DAIRY
WAY OF
PRODUCT
ARROW
LOOK
WORLD
NZ
AUSTRALASIA
SOUTH AMERICA
LOCATION
A FRIENDLIER AND UNIFIED STYLE
ACHIEVEMENT
OTHER
ACHIEVEMENT
FINANCE
CARTON
DAIRY
ACHIEVEMENT
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ACHIEVEMENT
FINANCE
CARTON
DAIRY
ARROW
ARROW
GETTING TO KNOW US.
Fonterra is a big part of New Zealanders’ lives, yet only ten per cent of New Zealanders say they "know Fonterra well". To change this, the iconic farmer brand, Fonterra, has been sharing some stories about who they are and what they do throughout our country. In this regional update, we share some more details about what we do for the Canterbury, Nelson, Marlborough, Taranaki and West Coast regions. Because the truth is, in order to know Fonterra, is about getting to know your families. We’re not a corporation; we’re a co-operative owned by local dairy farmers and their families in your region.

SHARING A LITTLE PIECE OF LEESTON WITH THE WORLD.

Angelo Ward, 5, is a family-owned dairying farmer in Leeston, Upper Selwyn, and enjoys sharing his stories with his family about the dairy farming side. His family told him that a cow is a special animal, and he is fascinated by how it lives. They always encourage him to learn about the cows and their role in our everyday life. Angelo enjoys visiting the dairy farm every day to see the cows and learn more about them. He often tells his family how much he loves the cows and how much they mean to him.

WE’VE CONTRIBUTED OVER $550,000 TO MORE THAN 230 COMMUNITY GROUPS IN YOUR REGION.

To support our local communities, Fonterra has a community fund that provides grants to help local communities and organisations. A couple of our latest funding grants include helping the Ahuriri Valley Rotary to purchase new machinery so that patrons can stay where they are while drinking their favourite drinks; and growing up one of the local stars, a Mini Alpaca, with high-quality wool and a gentle personality.

TE WAIHORA/ LAKE ELLESMORE FRESHWATER IMPROVEMENT PROJECT.

The farmers that own Fonterra have worked in partnership with the Department of Conservation (DoC) to initiate the Te Waihora/Lake Ellesmere Freshwater Improvement Project. The project aims to improve the health of the freshwater ecosystems in the region. This includes reducing nutrient levels, controlling weeds, and improving water quality. The project is supported by a $9.5 million programme and is working with farmers to reduce the distance travelled by farmers by promoting a day trip.

CLANDEBOYE MOZZARELLA STRETCHES AROUND THE WORLD.

The largest producer of mozzarella in the southern hemisphere, Clandeboye, is redoubling its commitment to the global market by launching an exciting new initiative to supply mozzarella to the world.

DAIRY INVESTING IN CANTERBURY, NELSON, MARLBOROUGH, TASMAN, AND THE WEST COAST.

The largest dairy producer in the world, Fonterra, is investing in the Canterbury, Nelson, Marlborough, Tasman, and the West Coast regions. This includes building new plants and expanding existing facilities. In the 2016/17 season, Fonterra invested $2.38 billion in the region.

FREE MILK FOR 201 SCHOOLS IN YOUR REGION.

The Fonterra Milk for Schools programme has delivered milk to more than 2,000 schools throughout the country. In 2017, the programme was expanded to include all primary schools in New Zealand. The goal is to provide free milk for all primary school children. In the 2017/18 season, Fonterra provided 10,500,000 litres of milk to primary schools.

JOBS CREATED AT DARFIELD AND CLANDEBOYE.

Our Darfield plant is the largest single dairy milk processing facility in the whole of New Zealand. It has been designed to process up to 12 million litres of milk per day. This is the largest milk processing plant in the Southern Hemisphere. It has been designed to be as efficient as possible while minimising environmental impact. The facility is located in the heart of the Canterbury region and is one of the largest employers in the area.

The facility at Clandeboye in South Canterbury is one of the largest dairy factories in the world. It has a capacity of 12 million litres per day and is designed to be as efficient as possible while minimising environmental impact. The facility is located in the heart of the South Canterbury region and is one of the largest employers in the area.

FONTERA.COM

The Fonterra General Manager, Carl Hunt, said: “We are proud to have been a part of New Zealand’s dairy industry for over 100 years. We are committed to investing in the future of our industry and our communities.”
WHAT IS LEAN MANAGEMENT AND WHY IS IT SO EFFECTIVE ON DAIRY FARMS?

Sarah Watson\textsuperscript{1} and Murray Bowden\textsuperscript{2}
\textsuperscript{1}PeopleMAD, \textsuperscript{2}Mid Canterbury Farmer

Introduction

Most days, things happen to frustrate us...a tool you can’t find, waiting for someone, information not up to date, running out of product, fixing something that’s broken or fixing someone else’s mistake...and the list goes on.

By the time we have dealt with these ‘time wasters’ you are lucky if you have done any REAL work!

How true is this? How often do we spend valuable time and energy on things that really don’t add VALUE? Is this just the way things are? How do we escape this picture?

There are some key principals around raising productivity in your farm business that, regardless of size or scale, will help you to make your business sustainable and enjoyable for everyone involved for the long term. The challenge is how to get those systems in place, achieving quality results consistently... with the whole team on board, when we are already struggling to find enough time to do “normal” stuff. Applying LEAN thinking to the dairy farm business really can help you to find all that lost time and improve your productivity? However, it’s not easy, it will require commitment and drive and an upfront investment of time and energy.

How do we achieve the aim of long term, sustainable business productivity?

- Long term = over time
- Sustainable = repeatable consistently
- Productivity = value added activity.

The answer includes a number of steps:

1. Leadership

Notes:
2. Being prepared to change
3. Empowering our team
4. Identifying waste
5. Working out the root cause of waste
6. Standardising our solutions.

Most importantly though is the need to INVEST in ‘finding time’.

**We will look at steps 4 to 6 first...**

**Finding waste**

The reality is that there is a lot of waste in our lives – often both work and personal. Often we are so used to it happening that we don’t even recognise it for what it is. When was the last time you went looking for some information and couldn’t find it straight away because it hadn’t been filed? Or the correct spanner for the job hadn’t been put away in the right place so you had to go and look for it? Or you had to go and ask the boss what the next job was because he hadn’t written it up on the whiteboard?

Typically the definition of waste in business is “activity that doesn’t add value to the customer”. In a dairy situation that could be “activity that doesn’t add value to delivering as much high quality milk as we would expect from our system type, in a way that doesn’t compromise animal welfare, environment or people”. So reasonably complicated!

Waste can be categorised in to the following types:

- Motion (searching for information, tools, materials)
- Waiting (for people, products, animals, etc)
- Transport (transfer of information and materials)
- Storage (of information and materials)
- Defect (of information, product and materials)
- Over-producing (making too much product or doing it too soon)
- Excessive or inadequate processing (inefficient processes and procedures)

So what are some real examples of waste?

- Motion – putting up an electric fence but not having enough standards so have to go back to the shed to get more to finish the job.
- Waiting – the vat wash didn’t get done so can’t start milking until it is done.
- Transport – my manager forgot to tell me what drug to use to treat the cow, so now I can’t treat her till he comes back from his meeting.
- Storage – bulk buying calf meal and then not using it all.
- Defect – holes in baleage not taped up so baleage spoils and can’t be fed to the cows.
- Over-producing – made too much supplement and still storing some that is 3 years old.
• Excessive or inadequate processing – using twice as much water, and taking twice as much time, to clean the yard as another person in the team.

Can you think of some examples of each of these in your system?

• Motion –
• Waiting –
• Transport –
• Storage –
• Defect –
• Over-producing –
• Excessive or inadequate processing –

When we start to identify waste, we raise our awareness (and that of our team), it also means we can look at why this waste is happening so we can reduce it.

**Identifying the cause vs effect**

Often our natural tendency is to immediately FIX problems when we see them. That’s our job as managers isn’t it? The trouble is this is often just a ‘Band-Aid’ fix as we don’t stop to figure out what is really **causing** the problem…we are just fixing the **effect**. For example, continuing to replace the fuse when it keeps blowing instead of calling the electrician to find out why it keeps blowing…

Understanding cause and effect is critical to successful problem or ‘waste’ solving.

Some tips to help you find the root cause of a problem:

• Clearly define the problem.
• Before ‘blaming’ a person, consider that in 90% of cases a problem is caused by a lack of knowledge, skill, resources or system. That is, the problem is with the **PROCESS** not the **PERSON**.
• Discuss the problem with the team, don’t just assume you know what’s going on.
• Consider things like, where, when and how the problem occurs.
• Ask 5 whys to work out what the real cause might be.

Notes:
**Finding a solution**

Once you have worked out the ‘Real Cause’ of the problem you need to decide if you can eliminate or just minimise the problem. Often problems can be solved with simple, low cost solutions. In fact many frustrating causes of waste on farm can be solved by getting organised and having better systems.

Key points when putting solutions in place include:

- Involve the team, they do the work every day and will often have ideas on how things can be improved
- Keep solutions simple, that way they are easy to keep doing
- Change takes time, you will be having to break old habits and create new ones, so be patient
- Where possible use visual reminders at the point of use to help the team to remember the new way of doing things
- Pictures are worth a thousand works, especially when English is your second language
- Measure your progress to see if the changes you put in place work or not
- If your solution doesn’t work go back and check what you decided was the cause of the problem, maybe it wasn’t…

Once we identify the solution that works we turn that into a Standard Operating Procedure ideally with some visual controls. None of this is rocket science, in fact it is common sense really and if we stop and think through a problem we will take a lot of these steps without having to step through it like this. However, following a process enables us to ensure we apply the right thinking consistently to get sustainable results. More importantly it enables us to teach our people to use the same approach and start to solve some of their own problems. This is where steps 1 to 3 are important

**Steps 2 and 3...Being prepared to change and empowering our teams**

**Being prepared to change**

Achieving long term, sustainable business productivity requires good leadership, including being prepared to change and empower the team.

Change = different from previous state

Change is more than just doing things differently, to get sustained change often means changing the culture of “how things are done around here”. You have to work hard to achieve sustained change. When you plan carefully and build the proper foundation, then implementing change can be much easier and you’ll improve the chances of success. If you are too impatient, and if you expect too many results too soon, your plans for change are more likely to fail.
Keys to success are: leadership; creating a sense of urgency (reason why); having others in the organisation who will embrace and drive change; build a vision (picture of what good looks like) and communicate it to everyone; remove obstacles; create quick wins and build on your momentum. These steps will result in a culture that supports and encourages change and improvement.

**Empowering the team**

Empowering the team is allowing them to own and drive how things will be done, often your team will be the best people to work out a successful solution to problems because they work with it all of the time. Surprisingly the solutions our team will often come up with tend to be low cost, highly effective and quick to put into practice. The other benefit is when they “own” the solution they are more likely to ensure it happens and that new people know how it works. People are generally also happier in their work, more inclined to stay and will use their initiative.

**Step 1 – Leadership**

To successfully achieve steps 2 to 6 you must be prepared to guide, drive, coach, empower, support, encourage, provide boundaries, enforce consequences, set the standard and practice what you preach…in other words LEAD.

Changing from how things are done now to a culture where the focus is on continuously improving how things are done requires INVESTMENT. Investment in time and energy. We get short term change when we dictate the solution to our team. To get long term sustained change requires leadership, we need to give our team the chance to influence the solution.

**Can LEAN principals apply to dairy farming?**

DairyNZ has funded the development of FarmTune® a Dairy specific programme using LEAN principals to help farmers improve and implement greater efficiency in their business.

The programme has been successfully piloted in Southland, Canterbury and Waikato and is now available to farmers across most areas. The results have shown that yes…LEAN

Notes:
principals can apply to Dairy Farming and they do provide on-going, sustainable results, including saving time and improving productivity.

**Here is Murray’s story…**

Murray Bowden and his team from Mahanga participated in the 2016 Canterbury FarmTune® programme. Mahanga is 186ha, milking 780 cows located in Hinds, Mid Canterbury. The farm is part of the Rylib Group and Murray is the Farm Manager. Murray is also a member of the local SAR’s team and can be called out at any time. Before the FarmTune® programme Murray had Mahanga running well with some good systems in place and a pretty lean cost structure, however, he was looking for ways to fine tune and streamline the day to day running of the farm and felt that LEAN would potentially help to achieve that.

FarmTune® enabled Murray and his team to refine the systems they already had and develop new ones to support the team to consistently achieve the day to day requirements regardless of if Murray was there or not. The confidence that this created for the team was significant, they knew what they had to do, there was no frustration at being left to figure things out. Murray could be confident that while he was away (often with no notice) the daily jobs would get done to the standard agreed. One of the benefits for Murray was the removal of that ‘dread’ of “what will I find when I get back?” The farm owners have also seen the benefits, with the changes on farm providing them with confidence that the day to day performance will be consistent no matter what else is going on.

One year on from the programme and the team is still engaged in the process, they consistently finish work at 4.30pm (saving an hour a day compared with before FarmTune®), they get their breaks, rostered days off and holidays. Having people on holiday doesn’t create extra stress or pressure for the team and because they aren’t tired, they stay motivated. They continue to have input into how the systems work and have agreed what the standards are and are motivated to maintain them because it works for them.

Although it is hard to put specific numbers on the savings and benefits, Murray knows they have made real improvements in the following areas:

- Reducing milking by an hour a day for the entire season = 7 hours a week less shed running cost.
- At the end of the season, the whole team has taken all annual leave owed = no carryover of annual leave.
- Regular maintenance is up to date and no major breakdowns for the year.
- Team is happy and finished up by 4:30pm each day.
- Easy to train new people with robust systems in place that mean training a new person to do tasks like the plant wash takes 3 days instead of 2 weeks.
• Team is engaged and looking for ways to keep fine-tuning and improving how things get done.
• Team is more confident to use their initiative and make decisions, as they have the support of systems to guide them in their decision making.

Conclusion

Yes we can achieve improvements in efficiency and productivity in our business by applying LEAN principals. To achieve sustained improvement you have to be committed to changing the way things are done in your business, including being prepared to let your team ‘own’ and drive some of the process. Following a programme like FarmTune® will improve your chances of success.

References

www.dairynz.co.nz/farm/farmtune/
www.dairynz.co.nz/farm/farmtune/waste-hunt/
PLANNING YOUR PATHWAY WITH NUTRIENT CONSTRAINTS

Anna Higginson
Agri Magic Ltd

Local councils are currently introducing plans to meet objectives relating to water quality driven by Central Government. Nutrient management is a key aspect of emerging plans, which may have a significant impact on your farm business. Using the requirement for meeting nutrient management regulations as a catalyst for reviewing your farm business strategy will help to maintain control over the direction of your business into the future. This workshop aims to demonstrate how using OVERSEER as a tool we can develop a pathway forward. Having an understanding of the environmental constraint on your business, you will be in a better position to:

• Understand the impact your farm has on your surrounding environment
• Build a business strategy that is better able to respond to regulatory requirements
• Understand how within season and day to day operations may have an impact
• Ask great questions that can be useful in directing future research
• Advocate for your farm business.

The concepts of farming within limits and reducing nutrient loss are becoming increasingly familiar, along with the concern that compliance is only a cost to the business with no real value. OVERSEER is a tool used for estimating nutrient losses from a farm system; however, the emphasis has been on the use of OVERSEER nutrient budgets for compliance – to generate “a number”. Using a tool such as OVERSEER to run a retrospective nutrient budget each year is a waste of horsepower. A nutrient budget on its own has little meaning, and is of little value when you have a limit, or have to manage reductions. When well used however, with context and understanding of the farms physical resources, system, and business direction, OVERSEER is a powerful tool to highlight aspects of the production system that can be altered in a sustainable way for the business.

Notes:
Using a case study to step through the process, it is possible to relate it back to how you want to plan for your own farming business, and be able to see actions to ensure you are well placed to understand the impact for your business.

**Identify governing rules for the farm business**

The first step is to understand the rule maker for the property and who you will be reporting to. There are a number of “governing bodies” that may be holding you accountable for your nutrient losses and setting limits. Examples of these may include:

- Local Regional Council (Regional Plan rules, irrigation consent conditions, effluent consent conditions, land use consents, riverbed grazing consents etc)
- Irrigation schemes
- Overseas Investment Offices – OIO
- Milk/meat processing companies.

It is important to note that there could be several relating to one business, and they may involve achieving reductions in Nitrogen loss. Once you know your governing rules, you will know what you are required to quantify to determine your limit.

**Run OVERSEER to determine the limit associated with your nutrient losses**

As an example, a property located within the red zone under Canterbury’s Land and Water Regional Plan must ensure future Nitrogen losses do not exceed their baseline Nitrogen loss. The OVERSEER model calculates an estimate of nitrogen lost from the bottom of the root zone, and in many cases this becomes a limit.

It is important to note that in some Regional Plans there is still a requirement to quantify Phosphorus losses as well as Nitrogen losses, with limits associated with both.

**What is the impact of the constraint?**

After determining your limit, you can estimate the impact on your business by running a current OVERSEER nutrient budget and comparing the two. Running an additional scenario or scenarios allows the best comparison, and is an excellent way to see what management options your farm is sensitive to. This part of the process is the trigger for strategic discussions at a high level and looking across multiple years.

When running future scenarios, don’t sell yourself short. Start with what amazing would look like, and don’t quit on your dreams before you start. A well constructed nutrient budget can help identify key risk areas and enables you to identify practical means of managing N loss risks. Seeking sound advice is important to shed light on what it would take to make it happen. At Agri Magic we decouple intensification from nutrient loss; it is our challenge (on your behalf) to
continue increasing on farm productivity and resource use efficiency, and to mitigate the impacts associated with nutrient loss.

Once modelled, it is important to use a number of OVERSEER’s reports to check for sensibility. They help the modeller to know if the scenarios are realistic and also which aspects of the system are the most sensitive to losses. It is commonly known that aspects such as improving irrigation water use efficiency and reducing drainage will reduce nitrogen losses. However, given the complexity of farm systems, and the impact of the rules, an understanding of what is driving nutrient loss for your property and being able to identify where you would make the best improvements within the context of your farm business objectives is fundamental. Understanding how your management changes affect nutrient loss is still a new concept, but as farmers, you naturally grasp cause and effect and OVERSEER helps us demonstrate that.

Through analysis of the scenarios, and quantifying the magnitude of the limit, the key risks associated with achieving your goal or scenario become clear. Everyone making operational decisions within your farm business needs to understand the constraint, and the impact their decision making has on that.

Each farm is unique, with different mixes of resources including soils, climate, topography, irrigation opportunity, and management (capability and style). Because of this, your situation will be different to your neighbours and requires a customised approach.

**Linking the limit with day to day and within season operations**

Some farms will be operating very close to their limit already and may require stricter management going forward; others may have wriggle room in the system to respond to seasonal changes associated with climate, people, and pay-out.

For each farm the risk associated with nutrient losses will be different. On one farm for example, managing the rates and timings of nitrogen fertiliser use may be a greater risk to nutrient losses than growing a crop on the platform for transition feeding. Another good example to think about is the consequence in regards to nutrient losses if you cannot respond to your soil moisture monitoring technology.

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Notes:
OVERSEER nutrient budgets and Farm Environment Plans are key tools available for managing risks associated with environmental limits. A Farm Environment Plan, is a live document you use to record the good management practices you are already implementing on-farm, the evidence you have of this, and any future actions required.

Bullet pointing these points on one page that can be easily located (in the dairy diary), and that is updated each season is a great way to focus the most important day to day, or within season actions and consequences. This document can be updated when you complete your year-end nutrient budgets for compliance and are planning for the next season. Having completed your feed and financial budgets for the upcoming season at this stage is also useful as it your responsibility to know what you can afford if mitigations are required. At Agri Magic we can provide a one page Agri Magic risk sheet customised to each farm to highlight the key seasonal and day to day decisions that impact the ability of that farm to remain within its limit.

The role of new research in your system

There is a lot of research being undertaken to identify ways to reduce nutrient losses on farms. Often the research will look at one aspect of the farm system; for example, the use of catch crops (such as oats) following winter feed crops. It is important to understand the impact new research has on components of a farm system, however, any potential options should not be looked at in isolation. Using the catch crop example, when integrating a catch crop of oats following kale into your management plan, the nitrogen losses may be reduced on that area of the farm that was in winter feed; however, the impact across the whole farm could be minor. It is fundamental that new research or mitigation options are modelled within the context of your whole farm. Any future reductions required are not based on a block within your property, they are across the whole farm, therefore, a number of mitigation options may be required to achieve the reductions required.

Influencing your future

“Effects based policy” is an opportunity for you to continue to innovate and to manage your own reductions. However, it is fundamental that you, and those influencing your farm business understand your own impact first, and how what you do within your farm impacts nutrient losses. Once understood, you can make a plan to move forward through this new world of nutrient related constraints. A change in culture around on-farm recording, combined with amazing new Information Technology options becoming available could present huge opportunities for our industry in the future. If you don’t plan to embrace this period of change as a way to improve business performance and get the most out of the inputs you are using, you risk being forced by input controls.
With better insight for your own business, you immediately become a far better advocate for not only yourself, but for your industry. You will be able to communicate back to the community the changes and progress made, and be in a better position to influence future policies. Invest in gaining a better understanding of the risks associated with your business to be able to plan your pathway forward; it is complex and could have a big impact on the future of your farm business.

Notes:
FIND YOUR ‘PLAN A’ BUSINESS

Debbie Kinder
FarmWise Consultant, Livestock Improvement, Canterbury

Summary

Milk price fluctuations in recent years have put significant pressure on farmers and farming businesses. The recent lows in milk price have yielded negative cash flows and an increase in farm debt levels.

Farmers have made initial short term changes and now it is time to implement a strong ‘Plan A’ business going forward.

A ‘Plan A’ business is not time consuming or difficult to set up, it takes discipline to monitor and maintain. The benefits of this type of business is resilience and greater profitability over the long term. It enables the owner to drive the business, rather than being driven by the business, to achieve the long term goals.

To achieve a ‘Plan A’ business requires:

• Clear short and long term goals.
• Setting the business up to allow time to manage.
• A strong cash flow that is a living document monitored monthly at a minimum and revised quarterly.
• Setting KPI’s for inputs and outputs, e.g., targets for pasture management, production, operating profit, etc.
• Keeping break even milk price low < $4.90/kg MS (DairyNZ Economic Survey 2015-2016), and operating profit per hectare high to provide resilience during a low milk price cycle.
• Monitoring the debt: asset ratio to meet your desired level of risk.
• Keeping it simple.

Notes:
Introduction

Over the last three years, low dairy prices have put pressure on farm systems, farm businesses and farmers themselves. This has led many farmers to assess how strong their farming business is and with the pressure expected to remain for some time, looking at how they can build a stronger business to weather these fluctuations.

The response to date has been fairly reactionary with farmers focussing on reducing farm cost structures; ‘tightening their belts’ to combat the low milk price environment. This is an appropriate short-term reaction, but we are now into a secondary phase of restructuring business and farm systems to be economically sustainable at the long term average milk price. The question is ‘How do you plan to operate going forward in a market that could well stay at this level indefinitely?’

What is a resilient or sustainable farming business? One definition of a sustainable farming business is one that has the strength to withstand financial and climatic stressors while meeting environmental and animal welfare compliance, and come out in a productive position with a balance sheet in good shape. A strong balance sheet and operational profit are key to thriving in the industry.

The current situation

Table 1. Key Financial Benchmarks (source DairyNZ Economic Survey 2015/2016)

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Operating Expenses $/kgMS</td>
<td>5.03</td>
<td>5.17</td>
<td>4.94</td>
<td>4.45</td>
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<tr>
<td>Operating Profit $/ha</td>
<td>1830</td>
<td>3295</td>
<td>1537</td>
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<tr>
<td>Term liabilities $/kgMS</td>
<td>20.82</td>
<td>20.14</td>
<td>21.26</td>
<td>22.49</td>
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<tr>
<td>Debt:Asset %</td>
<td>43.7</td>
<td>41.9</td>
<td>45.8</td>
<td>50.3</td>
</tr>
<tr>
<td>Equity Growth %</td>
<td>13.0</td>
<td>9.7</td>
<td>-3.5</td>
<td>-9.3</td>
</tr>
<tr>
<td>Break Even Milk Price $/kgMS</td>
<td>5.98</td>
<td>6.35</td>
<td>5.77</td>
<td>4.93</td>
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</table>

Over the last couple of seasons, with a reduction in milk price, operating profit per hectare has declined while term liabilities and debt to asset have increased. A large percentage of farmers have run at a cash loss and transferred this loss into term debt.

From the 2013-2014 season to 2015-2016 season the percentage of farmers with greater than 60% debt to asset ratio has increased by 15%. Debt to Asset ratio at the end of the 2015-2016 is illustrated in Figure 1.

The higher the debt to asset ratio the less resilient a business is – due to the commitment to pay interest on debt. Businesses with higher debt to asset (shown on right of Figure 1) are
more vulnerable at a lower milk price due to the cost of the interest overhead. The cost of this debt is out of the farmers’ control.

![Figure 1. Debt to Asset Ratio 2015-2016 (Source: DairyNZ Economic Survey 2015-2016)](image)

Over the last four seasons equity growth has also declined. This decline is due to a reduction in profit, increase in liabilities and minimal or negative change in capital value held in land and stock, hence a negative change in equity.

Over the last couple of decades a significant proportion of growth in equity has come from asset appreciation, an increase in land and stock value.

Many of you will have a view on whether land values are going to continue to appreciate or not. That’s a personal view and a personal situation. One thing that won’t change is that the integrity and strength of your cash flow will be as critical to your business in twenty years’ time as it is today.

A strong, resilient cash flow gives you the ability to withstand market shocks and pursue your goals. A weak cash flow takes away time, opportunities and choices.

All farmers need to revisit the plan for their business. Is it going ahead or are we standing still? How vulnerable is the business to milk price fluctuations and how dependant is our future on growth in capital value?

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Notes:
The last few years have given farmers an opportunity to look at the cost of production and to make some short term and, in some cases, longer term changes. The initial dust has settled a little with the milk price coming up to the $6 mark and this has provided some much needed ‘breathing space’. This higher milk price may or may not last so now is the time to take a long hard look at your business. It is time to identify and establish your ‘Plan A’ business.

**What is your ‘Plan A’ business and how do you get there?**

What is not a ‘Plan A’ business?

- No short or long term goals.
- No set targets.
- Prepare a cash flow for the bank once a year and never look at it.
- Fully immerse yourself in the day to day running of the business and don’t stop to look at the business.

Does this sound familiar to anyone?

Identifying your ‘Plan A’ business requires a full review of the whole farm system. The strengths, weaknesses, risks and opportunities across all components of the business need to be assessed including strategy, governance, finance, environment, people, animals, pasture, feed, reproduction and infrastructure. Is the whole package currently working?

Firstly the strategy is the overall driver of the business. This has to take into account both the business and personal motivations of the individual farmer.

The key questions to ask are:

- What is important to you?
- Where are we now? The current reality.
- Where do we want to be?
- How will we get there?

The answers to these questions formulate direction and goals for the business.

Are the current outcomes from the business going to meet the short and long term plans?

If you have the dream of purchasing the land next door or perhaps retiring from day to day management in 10 years’ time but your cash flow is currently in the red, this dream is unlikely to be a reality. If this is the case it is time for change. It is time to ask the tough questions.

**What is important to you? Where do we want to be?**

A clear strategy is critical to achieve the optimum result rather than the default result.

What does life look like in 5 years and 10 years’ time? Set both personal and business goals. With the majority of dairy farms owner operator the personal goals often drive the business goals. Make these goals SMART, specific, measurable, realistic and achievable.
Goal: Move back from day to day management in five years’ time.

Current Situation: No time or money available to do this. Break even milk price is $5.75/kg MS and overdraft is still in the red from the last two seasons. Definitely no time for looking at the budget, no idea how the budget is tracking. Take very little time off at present as no one seems to get the pasture management right, the staff don’t know what to do if you’re not there.

Change required: Set targets for all financial KPI’s and monitor these. Analyse the current cost structure and make changes where possible. Is the overall system efficient and is it the best system for this property? Put in place simple systems so all staff can complete daily tasks when needed? Take time to plan the workflow and delegate to staff appropriately? Have clear targets in place and explain to staff the purpose of these. Provide staff with training. Are the right staff employed?

Goal: Reduce debt: asset ratio from 70% to 60% over the next 5 years.

Current Situation: Break even milk price is $5.90/kg milk solids and forecast milk price is $6.00/kg milk solids. At this rate there is very little debt reduction if any. It only takes a large plant breakdown and any surplus is spent. A milk price of $5/kg milk solids and the business is heading backwards.

Change required: At least $1/kg milk solids of business profit available to repay term debt. Reduce breakeven milk price by 0.80c/kg milk solids. Benchmark key areas of the business to identify opportunities to achieve production efficiencies. Is the current system the most efficient for this property?

The plan may need updating along the way but the target remains the same!

Where are we now?

Navigational tools are needed to identify where the farm is now and guide all decisions. These include:

• Benchmarking

Note:
• Cash flow budget
• Balance sheet/Accounts
• Pasture Management Plan, Feed budget
• Milk Production Information
• Herd reproductive performance.

Understanding the metrics of the business provides opportunities. How does your business compare to the top 25%? Allow time for benchmarking.

*Key financial performance indicators include:*
• Operating expenses ($/kg MS)
• Operating profit/ha
• Return on Equity
• Break even milk price 2015-2016 New Zealand Average $4.93/kg MS.

The break-even milk price is a business indicator of success and highlights the ability of your business to cope with milk price fluctuations. All systems can make changes to bring the break-even milk price down to a more secure level in relation to that individual business.

Debt: Asset ratio is also important. It is not a direct measure of performance but an indicator of risk. A farm with a debt: asset ratio of greater than 65% carries great risk. This risk level varies also depending on how strong the cash flow is. A lower break even milk price and a strong cash flow help reduce the risk of high debt.

**Table 2. Dairy Farm Performance 2015-2016 (source Economic Survey 2015-2016 DairyNZ)**

<table>
<thead>
<tr>
<th></th>
<th>Top 25%</th>
<th>Bottom 25%</th>
<th>Top 20% 2016/2017 Canterbury</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial KPI’s</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Working Expenses</td>
<td>$3.00/kg MS</td>
<td>$4.27/kg MS</td>
<td>$3.32/kg MS</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>$3.74/kg MS</td>
<td>$5.48/kg MS</td>
<td>$3.49/kg MS</td>
</tr>
<tr>
<td>Operating Profit</td>
<td>$1073/ha</td>
<td>-$1097/ha</td>
<td>$2550/ha</td>
</tr>
<tr>
<td>Return on Dairy Assets</td>
<td>1.7%</td>
<td>-2.4%</td>
<td></td>
</tr>
<tr>
<td>Break Even Milk Price. NZ</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>average 2015/2016 $4.93/kg MS</td>
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</tbody>
</table>

Profit and a strong cash flow provide time and choices. Financial planning and monitoring makes decision making easier.

*Key physical performance indicators:*
• Pasture eaten (tDM/ha)
• Cow efficiency (kgMS as % of liveweight) Target 80 -85%
• Total supplements used (kgDM/cow).
Figure 2. Pasture Eaten compared to Operating profit (source: DairyNZ)

Figure 2 illustrates that operating profit increases as pasture and crop eaten increases. Pasture is the cheapest form of feed on the farm. How many farmers carry out farm walks and measure this resource? Pasture eaten is a simple calculation. There are templates available on the DairyNZ website or your farm consultant can help with this.

**How do we get there?**

Set targets and follow up with a concise action plan to achieve these. The action plan is focussed on achieving the short and long term goals. The first step is simply making the most of what you have on farm and utilising management tools.

This is not a new concept but one we lose sight of when the milk price goes up and often one that is forgotten when the milk price goes down. The good news is the majority of changes needed often do not have a direct cash cost but do require an investment in time and commitment to ‘make it happen’.

Ensure all day to day decisions are consistent with your long term plan.

Set up a forecast budget and cash flow and monitor monthly and update quarterly. Every area of expenditure can be analysed in relation to the goals and direction of the business. There are no surprises.
If there is no pasture management plan in place, no targets and no farm walk are you making the most of the largest resource and how do you measure if purchased feed provides a return?

The greater the pasture production and feed eaten the greater the operating profit. For example: (Based on a return of $350/tDM/ha)

A 200ha farm growing 16tDM/ha and eating 12tDM/ha. 75% of pasture is utilised.

An increase of 5% generates an additional $56,000 minimum
An increase of 10% generates an extra $112,000 minimum. This is a significant financial gain.

Time taken to set targets, monitor the situation and form strong guidelines on purchasing decisions can yield a significant return.

For many farmers operating expenses have been high over the years of high milk price and many farms have systems that are not simple to manage. Greater capital structure requires greater profit per hectare to provide an equivalent return and is not easily ‘detuned’ during times of low milk price.

Low capital cost systems tend to have ‘smoother’ cash flows and lower operating overheads. These systems are more robust in times of lower milk price but also do not make as much at the higher milk price. They do tend to be sustainable long term. Adding cost is easy but removing it is difficult.

Try not to be tempted to chase marginal return unless it fits in with your business plan. Always ask the question is the added cost a fixed cost or a variable cost. Fixed cost is harder to remove. Layering in additional long term overhead to chase a short term marginal return is very high risk. Suddenly the marginal cost/ marginal return looks very different. Think about the long term consequences.

Marginal cost and marginal return are variable. Spending a dollar to make a $1.50 depends on a price point, in this case milk price. If the milk price drops make sure the extra $1.00 can be removed.

All decisions need to be based on the long term goal. Do not spend on additional resources unless you are making the most of what you currently have. This includes land, stock, staff, water, feed, machinery, etc.

For some the changes will be small, if at all, while for others this may be a big mind set shift.

All farms have the ability to set up a “Plan A’ business model.

“**To achieve your ‘Plan A’ business**

- Set clear short and long term goals.
- Set the business up to allow time to manage.
• The cash flow is a living document monitored monthly at a minimum and revised quarterly.
• Set KPI’s for inputs and outputs. eg. Targets for pasture management, production, operating profit, etc.
• Keep break even milk price low, < $4.90/kg MS (DairyNZ Economic Survey 2015-2016), and operating profit per hectare high to provide resilience during a low milk price cycle.
• Monitor the debt: asset ratio to meet your desired level of risk.
• Keep it simple.

A ‘Plan A’ business is not time consuming or difficult to set up, it takes discipline to monitor and maintain. The benefits of the business is resilience and greater profitability over the long term. It enables the owner to drive the business rather than being driven by the business to achieve the long term goals.

References


Notes:
WHAT’S MY FUTURE IN THE DAIRY INDUSTRY (FOR THOSE IN THEIR 20S)?

Brent Love
KPMG

So you have got yourself to here? Well done. With a bit of luck you have worked hard at secondary school, and you may have even advanced to tertiary study or got started on some Primary ITO development. You may have even found out, through some early mornings and time in a cowshed, that dairy farming is your future. Congratulations, you will do well.

Many have been before you, actually to be fair to you, they actually haven’t been where you stand today.

You are the new generation where the career pathway isn’t quite as clear as it was 10 to 15 years ago. Back then you could start where you are at now, realistically with a little luck, and by doing a tonne of hard work, you could achieve the success of land ownership as the ultimate goal.

Things have changed – the capital hungry business of the dairy industry, and the roller coaster ride of commodity prices, has changed the game plan for many. At times you can become disoriented, and wonder why you are perhaps doing what you are doing, and you may start to consider what success looks like.

So let’s develop a plan. The plan needs to span the next 2 to 5 years is more than enough. Make the plan robust, include both financial and personal plans. Your plan will need action points to help achieve the short to medium term goals or achievements. Make sure that plan is heading in the general direction of what your “dream” outcome looks like.

Be flexible in the plan and be realistic. If you have no capital today and you are earning a $50,000 salary, and you are paying off your car and student debt, I will be honest. Having a plan of owning a 1000 cow dairy farm in Canterbury within the next 10 years may not be realistic.

Understand what the financial and personal requirements of your present commitments are, and how that works with your plan. Be committed.

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Notes:
Realise that what you’re doing today might be a reasonable outcome for you. I have successful contract milkers who have achieved significant wealth creation over the last few years by saving hard, investing in long term assets like property, shares or their kiwi saver schemes and using debt sensibly.

Buying cows to lease out for nothing to start a herd and maybe go 50/50 share milking at Temuka is not really a plan. This has a significant risk associated with it that you cannot control or mitigate. Be successful at being counter cyclical - sometimes that means you have to stick to your knitting, take calculated risk that has at least a B plan attached to it and don’t be greedy on either entry or exit.

Understand that the management jobs in the dairy industry compared with a lot of other jobs or careers are relatively well paid both in monetary and lifestyle terms, and while they may not allow you to purchase a farm, they do allow you to plan for a successful financial outcome for you and your family.

Value what you do today. I see a lot of people in the industry spending time daydreaming about the future but actually failing to do a really good job of what they are supposed to be doing. This is an extremely important point, when you have little capital, relationships and what you offer in raw physical and mental ability become extremely important to the success that you will achieve in the future. If you blow through jobs, especially at management and share milking level, eventually this catches up with you and reputation in this industry is paramount.

Be kind to those around you, and please remember that your solar system doesn’t control the universe. What this means is asking your employer for a pay rise isn’t a right; negotiating by ultimatum can be extremely dangerous to your future relationship and opportunities.

Understand that your brand is something you establish; how good you are at building that brand is your responsibility. However, the test of this is the value that your employer will pay for your ability, whether this be in dollar terms or in opportunities.

The opportunities in the industry remain endless, and they aren’t all based on farm ownership. I have seen contract milkers with more asset base than their farm owners. This industry supports those opportunities in all sorts of ways; through education, progression within the farm and through the industry in either management, contract or share milking. The future is bright for people who are well skilled, financially secure in their own right to take up those opportunities.

Remember, get a plan, take responsibility and ownership for the plan, be realistic and do what you do right now as well as you possibly can.
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BREEDING STRATEGY – REFINING YOUR SEMEN

David Chin
LIC

What are the core principles behind a successful breeding plan? What do the best herds in the country do to accelerate their genetic gain? If I wasn’t constrained by reproductive performance or economics how would I run my mating program? As a dairy farmer engaged in breeding your own replacements you will have inevitably asked yourself these sorts of questions at one time or another.

The answers to these questions are important to understand especially as the dairy industry comes off 20 years of continuous growth in both cow population and production growth and enters a period of relative stability and consolidation. Six years ago when I visited dairy farms the conversation was all about generating more replacements as farmers wanted to increase cow numbers or take advantage of a market where AB heifers and in milk cows were highly sort after. Now the conversation is changing and farmers are focusing on generating more high quality replacements.

This paper looks to explain a core principle behind all good breeding strategies and how you could implement this on your farm.

Breeding strategies

To understand the impact of breeding strategy on genetic gain let’s take 3 scenarios:

• **Scenario 1**: Mate your herd to the top 15 bulls on the RAS list.

• **Scenario 2**: Mate your top 10% of cows in the herd to the Top 5 bulls on the RAS list and mate the rest of your herd to the top 15 bulls on the RAS list.

• **Scenario 3**: Mate your bottom 10% of cows to beef/SGL bulls and mate the rest of the herd to the top 15 bulls on the RAS list.

Notes:
If you weren’t constrained by time, reproductive performance or economics, which scenario would you choose to accelerate your genetic gain?

**How should we test this?**

To find the answer to the above question we have developed a model. It uses the Lincoln University Dairy farm. The controls in the model are:

- Every cow has an equal chance of generating an AB heifer replacement.
- Every cow has an equal chance of being mated to the top bull on the RAS list (and the bottom bull).
- Replacement rates are 25%.
- In all cases when mating elite cows to elite bulls the top 5 bulls will be used.
- BW will be used as the ‘trait’ we are breeding for.

In real life, not every cow gets pregnant, and not every cow has an AB heifer calf. In some seasons, a high percentage of your best cows may have bull calves, in other seasons they may have a higher percentage of heifer calves. All this impacts on the final BW of the progeny group. The model that we have developed takes all this into account. How it works is that it randomly mates cows to different bulls in the bull team. It then randomly selects 25% of cows to have an AB heifer calf. This process is repeated 1,000 times to try and cover all eventualities – it basically simulates 1,000 years of spring mating, randomly matching bulls to cows and randomly selecting 25% cows to generate a AB heifer replacement.

The graph below is the output of Scenario 1 where the Lincoln University herd was mated to the top 15 bulls on the RAS list. The BW of the calves is depicted by the bell curve line. In some years the best cows had AB replacements to the top bulls, in other years the poorer cows had AB replacements to the lower ranked bulls.

The output of 1,000 iterations of randomly mating the same team of 15 bulls over the same herd results in a line of calves with an average BW of 145.
Scenario 2. I want to get more genetic gain – I think I’ll buy some straws of the very best bulls and mate them to my top cows

This is a fairly common situation on many farms. When you want to accelerate genetic gain, it’s a common option to mate your top cows to a select group of top bulls. This will generate an elite group of calves which will start forming the nucleus of the next generation of replacements.

This is not a silly approach and the logic is good. Mating your top 10% of cows to the top five sires and then mating the rest of the cows to a selection of high BW bulls will generate a line of calves with a higher BW than our baseline scenario. In this case the average BW was 147BW which is 2BW higher than the baseline.

As with the baseline scenario, there is random variation a play here, so it is statistically possible to generate a lower BW line of calves than the average of the baseline (but it’s fairly unlikely).

With this mating strategy, you are prepared to pay for more for selecting the top 5 bulls to get a superior line of calves on the ground. Regardless of which genetic company you deal with, the very best bulls are always in short supply, so a premium is charged to secure these bulls.

Scenario 3. What’s really holding back my genetic gain?

This may seem counter intuitive for some, but creating an elite group of calves (by mating your top cows to the top bulls) may not yield the best outcome. The issue with this

Notes:
mating strategy is that you still have the possibility of generating replacement stock from your very worst cows. So while an elite group of calves is generated, so too are a tail end group of calves with considerably lower BWs. These two groups tend to moderate each other and the average of the total line of calves is not as great as you expect. It is these tail end calves that are the handbrake on the herd’s genetic gain. By developing a mating strategy which prevents the worst cows from producing tail end calves to enter the milking herd, superior amounts of genetic gain are possible.

There is a 4BW point advantage from mating the whole herd to the top 15 bulls and preventing the bottom 10% of cows generating replacement progeny. This is 2BW MORE than the mating strategy that creates an elite group of calves.

The baseline scenario generated a progeny group that had 145BW. The strategy of not keeping replacements from the bottom 10% of cows generates a progeny group with 149BW. Furthermore, over 1,000 iterations did this strategy generate a line of calves that had a lower BW than the baseline average? The lowest 3 iterations were 145BW (which is the average of the baseline scenario). In the 997 other iterations, this strategy generated a superior line of calves.

**How do I prevent the bottom 10% of cows generating Ab Heifer replacements?**

Depending on the quality of your herd you have one of two options available.

1. If the herd is of high genetic merit, then the calves, if correctly matched to sire and dam, could be sold to other farmers.

2. If the herd is of average genetic merit, beef semen could be used in the bottom 10% of cows. This way you can easily identify the calves and they can be sold as dairy beef. Also, more often than not beef genetics command a lower straw price than dairy genetics so this option can be very attractive.
Management tip

Put a pink button tag into the ears of cows that are in the bottom 10%; this way they can be easily identified by the AB tech at mating time and they can be easily drafted off at other times of the year.

Do I have to alter my mating plan?

YES. The mating plan will have to be extended if 10% of the cows will not produce an AB heifer. For a herd with average reproductive performance (80% 3 week submission rate and 50% conception rate) 4 weeks AB will generate 21% AB replacements. All things being equal the same farm will have to extend AB by 4-5 days to generate the same number of replacements from 10% fewer cows. If the mating plan is not extended, the farm will not generate enough replacements.

Good reproductive performance is also required. If there is a concern, then the number of cows going to beef/SGL semen will have to be reduced - 5% or 3% will still be better than doing nothing.

Can you use the same strategy for very high BW herds and very low BW herds?

Yes. The advantage is greatest when the variation of genetic merit within a herd is large and the BW is low, and the advantage diminishes as the variation within the herd decreases (and/or the BW is high). But in both instances, the strategy of not bringing in daughters from the bottom 10% of cows yields higher genetic merit calves than both:

- The baseline mating strategy and
- Mating the top 10% of cows to the top 5 bulls.

implementing both strategies results in the most genetic gain

The most genetic gain is likely be achieved from a combination of:

- Using a smaller number of elite bulls and,
• Not keeping daughters from the bottom 10% of cows.

There is also the topic of mating yearling heifers, which would give you even more genetic gain, but that is a topic of a different paper. The fundamental core principle still stands:

*The most important thing you should know about your herd is who the worst cows are.*
RECRUITING AND RETAINING STAFF: ARE WE SELLING OURSELVES SHORT?

Mark & Devon Slee
Farmers, Melrose Dairy Ltd, Ealing

As a business, over the course of 28 years, we have evolved from a staff base of three in 1995 to fifteen in 2015; from a single dairy unit operation to three dairy units and a support block. The level of complexity in the management of the operation has increased alongside the compliance required. We have needed to bring in others to do what we used to do ourselves, that realisation has given us strength but has also brought its own challenges. We must become better at managing staff, they are an essential part of running our farming business. For Devon and I this has been a path of self-discovery, of “plan-do-review” cycles and adapting to new realities.

Here’s some of our learnings that we have collected along the way:

1. **If you are not prepared to put in the time and effort to recruit the right person from the start, then your chances of starting along the right path but with the wrong person increase exponentially.**

Recruiting the right person usually begins with the advertising. We sometimes hear of people having employed a not ideal candidate, so the question remains: why are you getting non-ideal candidates applying for the job you are offering? Let’s say that you have a good reputation as an employer, the questions to ask could be: Is it because you are not selling the job well enough? Is it because you are not advertising in the right places? Is it because you are targeting the wrong market? What is the accommodation on offer like?

Which of the above do you think may apply to your own case?

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Notes:
What puts people off applying for a job?

An important part of advertising is the information we provide about ourselves and our business to any prospective employee. They have the same right to check our references than we have to check theirs. It is important for our full names and contact details to be advertised. Some people will approach us, have a chat and realize we are not what they are looking for or we realize they are not the right fit for us. We want them to do their homework on us before applying for the job.

What information do you provide about yourself in the ads? Would you change that?

There are different websites and recruitment companies in which to place ads nowadays. We have started asking ourselves lately whether we need to start thinking a bit more carefully as to where we place our ads depending on what type of staff we are looking for. Rather than, “Well, people that want to find jobs in agriculture will go and look at Fencepost”, putting a bit more time into thinking, “I want this type of person to work with me, where are they? Where do they hang out? Where do their families, who know what these people are looking for, look for information?” If you are looking for a person that is new to our industry, or a single, young person that will have no trouble sharing accommodation with others, should we be advertising on Fencepost? Or rather in University publications? Or in the local newspaper where the families of those young people are looking for information? Or even on Facebook rather on specific agricultural websites?

If you think about the current position you might be recruiting for at the moment, what is the profile of person you are looking for? And where do you think they go for their information?
Over the years, we have developed a process which focuses on interviewing no more than 3-4 people for the one position. This process will be different for different people, but here’s what we do:

- Put our full names and contact details in the ad (phone and region)
- Clearly state that we require a CV and cover letter with references (this allows us to know who reads the whole ad and follows instructions provided)
- Once the applications arrive, we check CVs, cover letters and who the referees are
- We select those that we think are worth checking the referees and check them
- Then chose 3-4 of them for interview
- Interview on farm: the job interview starts from the moment they drive up the driveway (are they on time, what does the car look like, did they observe the speed limit of the farm?) to the moment they leave the farm
- We involve the right people in the interview process too; their manager needs to be there during the interview for example
- If they have a partner, we’d rather they were there at the interview too
- We have 2 ears and 1 mouth, we use them in that same proportion
- Our gut feel is also very important. If you feel that something is not quite right it usually isn’t
- Then we discuss all applicants and make the job offer if we have our ideal candidate.

This whole process takes time, we understand that, but we’d rather do the due diligence to find that right fit.

2. If you are not open to analysing your own performance as an employer, then you can’t expect to do a good job analysing other people’s performance.

We have found over the years that part of becoming a good employer is that we recognise our strengths and more importantly our weaknesses. Looking at ourselves and working on what we need to improve on.

Being a good employer requires self-awareness, self-management and being honest with how you run yourself (know who and how you are). This will translate into the team culture you
build, and increase your chances in hiring people that fit. The key words for us here are ethics and ethos. You have to know yourself, what you want and require, to know who you want around you.

Understanding why people leave us as employers can give us an idea of what we need to focus on. The answers are not always fun or nice to hear but give opportunities to review and implement any necessary changes. It helps us that there are two of us to bounce ideas and comments off; strong support systems are important.

Over time, our business has evolved and our focus naturally has changed. From one farm where we were very much hands on, to a business that requires us to step back and spend more time on operational and strategic planning.

Our focus now is on ensuring the next generation of farmers under our wing (our VOSM and Managers) have the right skills to move on down their own paths. We continuously ask ourselves and them, What is working well? What is not working well? How can we change it so it works?

3. **You cannot expect people to work harder than you. This is your business, not theirs.**

Your staff are not responsible for your business, you are. For us, our staff are there to help us achieve our goals, but not to achieve them for us.

If I am not prepared to stay past 6.00 pm to solve a problem in my farm, why would my staff be? If I am not prepared to put cups on, why would my staff be? If I am not prepared to respect their time off, why would my staff be? If am not prepared to work around their request for time off, why would they respect my time off?

Treat others as you would like to be treated yourself.

4. **Know your people, respect their individuality and work with them.**

Empathy and kindness are important words for us. We acknowledge that each of our staff is an individual and they have different things that make them tick. Some are happy to come to work on time, do a good job, get paid, and go home to enjoy time with their families. They are happy to have the same level of responsibility every year and job security. Other staff are looking for progression and they want to learn and be challenged at work. Understanding these differences is key to providing each staff member with the best experience you can while they are working with you.
5. **Whether a staff member is willing or difficult, work with them in good faith.**

   Even if someone is disengaged, or underperforming, if you approach with them in good faith, working through issues, it can result in a win/win situation for all.

6. **Look after your own reputation as an employer**

   Be 100% honest in everything you do. It is our policy to offer to be a verbal referee, we generally don’t provide written references.

7. **Money is not the most important thing.**

   Think about the job that you have on offer as a full package. It is not only the salary. You are offering a house to live in, a learning experience, a team culture, a work environment, a good roster, a chance to upskill.

   What are you offering as an employer?

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1. **Conclusion**

   The people that we employ are an invaluable asset and an integral part of running a healthy sustainable business.

   “Would I like to work for me, live in on this farm and be part of this team?” This is ultimately the question we encourage you to ask yourselves as employers.
WHAT’S THE RIGHT MANAGEMENT STRUCTURE TO ACHIEVE OUR OBJECTIVES?

James Allen
AgFirst

Introduction

The management structure options available for running a farm business continue to evolve to meet the needs of a changing industry. Likewise, for those who aspire to farm ownership, the pathways also continue to evolve. This paper examines the trends in the industry, but more importantly how to decide which management structure is going to be best for you to meet your objectives. The discussion will examine the pros and cons of the various management structure options and key areas to consider for success.

What are the trends?

Sharemilking has long been considered a cornerstone of the New Zealand dairy industry, providing a viable progression pathway for young dairy farmers to build experience and wealth, and traditionally aiming to achieve their ultimate goal of farm ownership. This pathway has been put under pressure in recent years, with the number of Herd Owning Sharemilking (HOSM) positions steadily declining, due to a variety of factors. In the past five years there has been significant fluctuation in the milk price paid to New Zealand dairy farmers, and this volatility has created additional problems for farm owners and sharemilkers alike.

The dairy industry in New Zealand continues to evolve, with larger farm sizes, more corporate ownership, and higher debt levels. These are some of the factors that have led to a steady decline in the number of herd owning sharemilking agreements in New Zealand, as evidenced in the following table. However the overall number of sharemilking agreements as a percentage of farm businesses has remained constant at around 32%. In other words, although there are fewer herd owning sharemilking agreements available these have generally been replaced by variable order or contract milking arrangements.

Notes:
With regard to changes in management structure, several key trends have emerged over the past few years. These include:

• The percentage of sharemilking agreements in the industry remains relatively static, but the percentage of HOSM continues to decline. Over the past five years the number of HOSM positions has declined by fifty per year
• The trend away from HOSM is more pronounced in the South Island
• The variation in milk price within seasons is causing problems with setting appropriate percentages for sharemilking agreements
• The variation in milk price between seasons, and the resulting fluctuations in herd values, is creating significant fluctuation in sharemilker returns, but also their equity levels. Timing of entry and exit is a critical feature for sharemilkers in terms of maximising equity gain (or minimising loss)
• A recent but significant trend away from variable order sharemilking into contract milking
• A steady rise in the role of the career professional manager, and associated structures on larger farms such as operational managers and general managers.

The following tables and charts illustrate the above points.

\textbf{Table 1. Trend in number of dairy farms and sharemilking positions over the past 20 years}

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<tbody>
<tr>
<td>All farms</td>
<td>14,597</td>
<td>11,883</td>
<td>11,691</td>
<td>11,970</td>
<td>11,000</td>
</tr>
<tr>
<td>All sharemilkers</td>
<td>5,016</td>
<td>4,260</td>
<td>4,041</td>
<td>3,879</td>
<td>3,500</td>
</tr>
<tr>
<td>HOSM (average drop in positions/yr)</td>
<td>3,614</td>
<td>2,719 (-90/yr)</td>
<td>2,303 (-80/yr)</td>
<td>2,050 (-50/yr)</td>
<td>1,800 (-50/yr)</td>
</tr>
</tbody>
</table>

* The estimate for 2020 is based solely on the author’s expectation on the number of dairy farms in New Zealand, combined with an extrapolation of the current trend in the decline of HOSM agreements.
Reasons for the decline in HOSM agreements include:

- Increase in average debt levels on dairy farms. The farm owner needs to have a moderate to low level of debt if they are to work with a HOSM using the traditional 50/50 split
- A perceived inequity in the financial returns between farm owner and HOSM
- A desire by some larger farming entities and/or corporates to retain ownership and control of their livestock assets.

It is important to note that this is not signalling the end of HOSM. There are many reasons why a farm owner would want to employ a HOSM, and it is still one of the best career pathways for young farmer to pursue. It is however highlighting the need to constantly adapt our thinking.

What other trends are we seeing?

- HOSM staying in positions for longer. This is a combination of difficulty in progressing to the next step of farm ownership, but also an increasing number of HOSM are realising there are good business reasons to retain their existing position

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Notes:
• There is a noticeable trend away from sharemilkers aspiring to farm ownership. In 1996 70% of sharemilkers responding to a survey were intending to go onto purchasing a dairy farm, compared to 47% in 2016. While in some cases this is almost certainly due to sharemilkers seeing farm ownership as a goal beyond their reach, there are increasing instances where they are content to remain in their position until retirement or in a career change. Additionally, there are instances where sharemilkers take on multiple positions, which further complicate progression pathways.

The relativity of cow price to land price is an important ratio impacting the ability to progress from HOSM to farm ownership. The trend in the number of cows required to purchase one hectare of land has risen from under 10 to over 20, as shown in the following chart. This creates another problem in the traditional progression pathway. This also highlights the importance of timing. Cow prices are strongly correlated to milk price, and astute sharemilker with good timing can take advantage of these trends.

Which structure should I choose?

What does success look like for a progressing farmer?

Although farm ownership is still a goal for many progressing farmers, having a business that provides good cashflow, a good lifestyle and opportunities to make other off farm investments, is now seen by many as a viable end goal in the dairy industry. To this effect, successful HOSM, VOSM and contract milkers are sometimes content to stay in these positions for longer periods, and may have no aspiration to progress to full farm ownership.
In some cases, larger scale HOSMs are in a position where staff might do the majority of the hands-on work, they live in a desirable location and have relatively low debt. If they move to buy a farm, they would typically need to decrease the scale of the property, may need to increase their daily hands-on role, may have to move to a more remote location where land is cheaper, and may significantly increase debt and business risk. The drive to own land is still strong for many New Zealand farmers, but the business and lifestyle case for doing so is not as clear as in the past.

Whilst cognisant of the above points, it is also important to recognise that the ability for a farmer to achieve the goal of farm ownership is still recognised as important for the dairy industry as a whole. The ability to achieve farm ownership provides a strong business incentive for farmers to continually innovate and seek new solutions for industry issues, thus driving productivity and profitability within given constraints.

**What does success look like for the farm owner?**

A successful progression pathway should look to achieve the following:

- Achievement of the farm owners’ goals and aspirations for their business and their personal goals
- Continued pathway of well qualified and highly motivated farmers to manage/sharemilk their properties
- Continued pathway of farmers/investors who are willing to purchase their property, in order to create and exit strategy.

**What does success look like for the industry?**

A successful career progression pathway for the dairy industry contains two key elements:

1. Retention of talented farmers in the dairy industry
2. A continued ability for farmers to progress through to farm ownership.

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Notes:
How do I decide on the right structure?

- The pathway to success is no longer a linear pathway, and the options are much more complex than ever before. For example, the traditional pathway to achieving financial stability and farm ownership was:

![Progression Pathway Options Diagram](image)

**Figure 1.** Progression Pathway Options
When assessing the pathway options for a progressing farmer or a farm owner deciding on the correct management structure, the following flow charts and decision matrix have been developed:

**Figure 2.** What type of operating structure should I pursue for progression?

**Notes:**
Figure 3. As a farm owner, what type of operating structure should I have?

The DairyNZ website also contains a matrix that allows a farmer to create their own list of criteria. This can be found at:

https://www.dairynz.co.nz/business/sharemilking/making-decisions/

It is also essential that all farmers undertake sufficient due diligence on the position available and the other parties involved. Further information on due diligence can be found at:

https://www.dairynz.co.nz/business/sharemilking/do-your-homework/
What will happen over the next decade?

As always, the market will ultimately decide on the best management structures to achieve the objectives of the individuals. Some points to consider:

Herd Owning Sharemilking agreements - Unless there is a significant change in approach there is no evidence to suggest that the decline in HOSM agreements will stop. However, it must be kept in mind that the HOSM agreement does contain a high degree of flexibility. The most obvious one being the percentage split between farm owner and sharemilker. However, if there is a significant reduction in the percentage of income paid to the sharemilker, one must consider safeguards for low pay-out years where the sharemilker is at significant risk of losing their business. This can be addressed by a minimum price that the sharemilker would receive.

Ultimately the HOSM agreement and the contract milking agreement are simply contractual arrangements between two parties. These clauses can be negotiated as required.

In contrast, the Variable Order Sharemilking agreement is governed by a legal statute. A key point to always remember is that the clause in the agreement cannot be altered to the detriment of the sharemilker.

The role of the professional farm manager is now clearly an established career option in its own right. This could range from Farm Manager to Operations Manager to General Manager. The key question for the individuals in these roles to address is how to effectively manage and grow their personal wealth, particularly if investing in the farm is not an option. This is no different to the majority of working New Zealanders who do not have the opportunity to invest in the business they work for. This highlights a need for an increase in financial literacy and understanding of alternative investment options. As an example, investing in a residential property, the New Zealand share market or even Fonterra shares may have provided a higher degree of return on investment in recent years than dairy farming as a business. This does require a change in our traditional way of thinking, where your wages for management and your investment returns were pooled into one entity. Separation of your return on your time from your return on your investments provides a much greater degree of commercial discipline for all.

Notes:
Conclusion

This paper highlights the changing nature of the traditional progression pathway for the dairy industry. While this is challenging for some, for those who can adapt it does create many opportunities. Be prepared, seek advice, have a plan and be commercially focused with your investment decisions.
THE SECRET LIFE OF COWS: SOCIAL BEHAVIOUR IN DAIRY HERDS

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Introduction

The behaviour of cattle, from a human point of view, signals to us their well-being. Cattle on the other hand are simply responding to external and internal cues which influence their strongest motivational driver at any given point in time. For example, a hungry cow has a strong motivation to consume the long grass on the other side of an electric fence, but fear of the fence is a stronger motivation preventing her from reaching the long grass. The term "behaviour" refers to the pattern of action observed in animals, which occurs either voluntarily or involuntarily. These behaviours are adapted to meet both physiological and psychological needs and which are exhibited through the following natural behaviours (Albright and Arave 1997):

1. Ingestive behaviour (grazing, eating supplements, drinking)
2. Movement (walking, running, stretching)
3. Body care (grooming, allogrooming)
4. Resting (sitting, sleeping)
5. Elimination (urination and defecation),
6. Sexual reproduction (mating)
7. Exploration
8. Association
9. Reactivity.

Of these behaviours many involve elements of social behaviour which, in cattle, are displayed and communicated among individuals in a way that benefits the group. As animals of prey it is thought that cattle originally formed herds to reduce the risk of predation and through social interaction facilitated learning of survival tactics, which enabled them to exploit resources available to them. Even though there are few examples of wild herds of cattle to study
nowadays, studies of social behaviour in domestic cattle today continue to demonstrate the necessity for cattle to interact and learn from each other. A common example of this is in calves which, when reared in groups, learn to adapt socially and form dominance positions as adults, compared with calves reared in isolation which form poor relationships and are often subordinates in adult herds (Phillips, 1993).

As humans, how we interact with animals has implications on not just animal welfare but on our own welfare, as most of us would acknowledge that contentment or distress in our cattle can impact our own feelings of stress or satisfaction. The reason for domesticating cattle was for mutual reward, with animals benefiting from reliable access to resources and freedom from predation, and ourselves benefiting from a reliable source of nutrition or labour (as with draft animals). However, the external landscape is evolving, as urban-rural competition for land reduces pastoral areas and political and social pressures drive change in our farm operation. Ensuring that the welfare of livestock is not compromised throughout these changes is critical to the sustainability of the farm business. A reflection of adequate animal welfare is that animals are able to express their normal behaviours. Generally, our farm management practises ensure maintenance behaviours, which meet physiological requirements, are being met, but are our practises making enough room for social behaviours? The purpose of this paper is to provide an insight into the social behaviour of cattle, what motivates them and how do they express their motivations through their behaviour?

Social organisation in herds

Dairy cows are socially gregarious animals. They exhibit allelomimicry (copying each other) in many of their behaviours and have developed their own complex communication channels (Phillips 1993). They establish a strong social hierarchy within the herd, and have developed ways to determine which cow has priority of access to resources. Social hierarchy is not static as dominant positions within a hierarchy need to be upheld and will be challenged by ambitious cows with strong motivations. Moreover, motivations to maintain a set hierarchy can shift, with changes in management influencing external cues and reactions within a herd. For example if management intensifies the system by increasing the stocking rate, the desire for space can become more important than for feed. Of key importance is the animals’ requirement for space as cows will try and maintain consistent spatial relationships with each other. The distance between individuals will vary depending on the activity, which is greater when grazing but closer when resting.

Mixing of groups will interrupt the establishment of the social hierarchy and thus may or may not affect individual or group production. The establishment of a social hierarchy within a group can take from 3 to 7 days (Phillips, 2002). Before a social hierarchy stabilises, agonistic interactions between the herd’s members will take place until it reaches stability. The aggressive
interactions that occur afterwards are ritualised to maintain the dominant rank of each individual in the respective herd. During this phase, an animal’s production performance can be diminished as social interactions take priority over feeding. This period of change and establishment of order can be stressful especially to younger or smaller members, such as heifers, in a cattle’s herd.

Hierarchy in a smaller herd of cattle stabilises much faster than in larger herds. The time taken to establish social hierarchy is extended as group size increases, and aggression between individuals also takes longer to stabilise. In large herds it takes longer for the rank of each individual to be determined because cows can only recognise from 50 to 70 herd mates (Fraser and Broom, 1990). Having a large herd leads to a relationship breakdown as individual recognition among herd mates becomes increasingly difficult. Thus the herd members tend to form subgroups. The social organisation of herds and subgroups within herds enable a matriarchy with different roles of individuals within that group. Ongoing social interactions and associations between animals within that group are important to confirm or challenge those positions.

Social organisation in cattle can be separated into:

- Dominance order
- Leadership – followership (e.g., herding pattern)
- Milking order
- Sexually active groups.

**Dominance order**

Dominance order consists of both dominant and subordinate animals and can be measured by observing the agonistic interactions between the herd members. When a dominant animal meets an animal with no established position in the herd hierarchy, initially there will be some aggressive interaction to clarify or to maintain their dominance position in the herd. This results in the subordinate animal moving away and avoiding further engagement or conflict with the dominant animal.
Although we often think of dominant animals as being aggressive, once dominance has been asserted it may take very little aggression to maintain that position, a simple toss of the head may be all that is required to remind others of the hierarchy. Spring can be very challenging for a herd of cows as this is when there is an influx of newcomers. Heifers, though inexperienced, can learn quickly how to move up the ranks, particularly those that are socially adapted from group rearing. They are often disadvantaged by size, but motivation can be a strong driver for young animals wanting to improve their rank. Since aggressive encounters are found to be the basic component in the establishment of an animal social hierarchy (Keeling and Gonyou, 2001), this gives us an insight that the amount of interaction occurring in a herd, and the types of encounters performed by each animal, indicates the stability of a social hierarchy.

**Figure 1:** Types of behaviour that indicates dominancy in cattle

Bunting or head butt, usually occurs during an aggressive fight between two animals. It involves a characteristic upswing of the head usually to either the head or flanks of the other animals. The force of the movement varies from a mild push to a severe blow. Pushing is when an animal is forcing its way through or towards other animals, using part of their body to displace another animal. This will result in pushing the other animal away or causing them to shift location. Allogrooming or grooming others acts as an affiliative behaviour, and that is characterised by one animal licking the other animal that is similar or slightly lower in position of the social rank (Phillips, 2002).
Table 1: Personalities of dominant and subordinate in cattle.

<table>
<thead>
<tr>
<th>Dominant</th>
<th>Subordinate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larger</td>
<td>Smaller</td>
</tr>
<tr>
<td>Heavier</td>
<td>Lighter</td>
</tr>
<tr>
<td>Older</td>
<td>Younger</td>
</tr>
<tr>
<td>Assailant</td>
<td>Victim</td>
</tr>
<tr>
<td>Bullies</td>
<td>Nice</td>
</tr>
<tr>
<td>Active</td>
<td>Passive</td>
</tr>
<tr>
<td>Busy body</td>
<td>Observant</td>
</tr>
<tr>
<td>Territorialise</td>
<td>Placid</td>
</tr>
</tbody>
</table>

**Factor determining dominance**

In dairy cattle, factors determining dominance are positively related to age or lactation number and size, such as body condition score or live weight. Age is a good index of seniority (length of time in herd) where higher-ranking cows usually associated with seniority in social hierarchical herd due to the fact that older cows are more experienced in having encounters with other cows compared to younger members of the group. On the other hand, weight is used as an index of strength where bigger and heavier cows have the advantage in performing more successful agonistic behaviour compared to smaller or lighter weight cows.

These factors are associated with the competition for space and considered the main driver for aggressiveness of cows in confined spaces in indoor feeding systems (Potter & Broom 1987). In a free stall situation, dominant cows have been observed lying closest to the hay feeder, deliberately making access more difficult for lower ranking cows (Nakanishi et al. 1993). For cows managed at pasture, adequate space is assured, and thus priority to the best grazing spots, having longer, undisturbed feeding time or having a preferred area to lie down are the major drivers of cow’s dominance behaviour (Barroso et al. 2000; Phillips & Rind 2002).
Leadership – followership

Leadership refers to the ability of an animal to influence movement patterns of the group in changing locations. The motivation in such social facilitation also varies according to the environment. Since cattle exhibit allelomimicry (‘copy cat’ or ‘follow the leader’) in many of their behaviours, the leading movement in the herd could be carried out by any member of the herd and is not necessarily associated with the dominance order.

In a forced movement such as during herding a mob of dairy cows, the herd movement is not necessarily led by the dominant cows. During herding, mid-ranking cows tend to be at the front and the most dominant cows stay in the middle, leading the herd by ‘pushing’ rather than ‘pulling’. (Phillips, 2002). The rear animals are most likely the less dominant cows. The dominant cows tend to have a greater flight distance than subordinate cows and are reluctant to be right at the back of the herd to avoid being close to humans. In the herding formation, being at the centre of the herd is considered a privilege to the highest ranking cows, and the less dominant cows which surround them act like a protective shield from coming into contact with the more dominant human.

This idea was supported by a study (Beilharz and Mylrea, 1963) involving a group of heifers, which were held in a small yard with an open gate guarded by two men. In this experiment, they found that the less dominant heifers were more likely to escape from the herd by willingly going through the open gate and risk ‘punishment’ from the human rather than being in close captivity to the other higher ranking heifers. This suggested that lower ranking animals are more afraid of the dominant animals than they are of humans.

Milking order

Access to milking machine in a parlour is again not necessarily related to the dominance order. It may be a priority of resource like having the opportunity to obtain food in the milking parlour or after milking or even to just relieve udder pressure (Phillips, 2002). There is some tendency for more dominant cows to enter the milking parlour early or wanting to be milked first, but it is more likely to be the higher yielding cows (Phillips, 2002).

Maintaining the same order of entry into the milking parlour does not seems to be of major or lasting importance to cows. However, they did exhibit a side preference in the milking parlour and preferred to be milked at approximately the same time each day (Phillips, 2002).

Sexually active groups

During oestrus, the need for personal space, which is usually a strong motivator determining social order, is altered. When a cow comes into ‘heat’ she wants to encourage the proximity of others and signal to them with visual and chemical cues that she is responsive and
ready to be mated. There is often more agonistic interactions during mating as social order is disrupted. For dominant cows, bulling is less of a problem for the purpose of getting attention, while subordinate or, smaller cows are unlikely choices as sexual partners.

Generally, pairs of females are likely to form a sexually active subgroup and if the herd is large with multiple animals cycling, then up to six females may form a subgroup. There may be multiple sexually active subgroups in large herds. These occurrences tend to disrupt the linear nature of hierarchy and sub-ordinate cows on heat will experience improved social status during oestrus as their motivation to be mated supersedes other fears which maintain their submissive social position. Consequently as the number of cycling cows diminish, it may be increasingly difficult to detect oestrus in sub-ordinate cows which are unwilling to mount or attract a partner to be mounted. However, there are few studies investigating social behaviour during oestrus in small herds, particularly with reference to subordinate cows.

**Implication of social hierarchy**

Social behaviour is among one of the few important behavioural needs of cattle. Since cattle are known to be highly sociable animals, they need to have the ability to socialise freely. Social hierarchy stabilises the herd where each and every member of the group has a function on its own according to their social rank. Unstable social hierarchy from mixing of a group or having a strange cow introduced into a herd will lead to a lot of aggressive interactions between cows, causing stress to the lower ranking animals.

Social harmony in a group of cows is important to maintain good production. Some studies have shown that behavioural stress from an unstable social hierarchy could prevent animals from achieving their normal reproductive success. For example, when agonistic interaction is high (e.g., from mixing group or from the introduction of strange cows into the herd), some studies have reported a reduction in milk yield while others had shown a decrease in live weight gain. Cows that are involved in more agonistic activity are also found to spend less time eating. Therefore, a stable social hierarchy within a herd, where less agonistics interaction is performed, should be a management target.

---

Notes:
Ways to avoid agonist or aggressive behaviour:

- Avoid changes in herds in which new members come and go.
- When returning lame or sick cows to a herd, try and return a group together rather than individuals.
- Cull low yielding subordinate and dominant cows to improve group stability.
- In circumstances where agonistic behaviour cannot be avoided, provide sufficient ‘flight room’ on surfaces which will not encourage lameness.

References


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USING PASTURE SMARTER  
(GETTING MORE WITH LESS WORK)

Graham Kerr, Janet Montgomery  
Agriseeds Ltd, 2547 Old West Coast Road, Courtenay, Canterbury

Summary

This paper covers five tips for ‘Controlling the Controllable’ that will help you harness more from pasture. These can make you A LOT of money ($145k/year on offer in Tip 1!) and for most there is nothing to buy; all that’s needed is some thought and time.

Pasture is the key feed for the NZ dairy industry, and analysis repeatedly shows it is a major driver of farm profit and also improves the resilience to the volatility of payout.

The way we manage pasture varies greatly between farms and there is potential for improvement. It is not a simple resource as its growth and quality are ever-changing, however these tips will help you to manage it well. So take up the challenge and improve your business!

Tip #1: Consistent residuals day-in day-out (except when wet)

This may sound pretty simple, but achieving consistent post-grazing residuals is hugely valuable. Around $145,000/year extra income is on offer from a small increase in feed quality measured in metabolisable energy or ME (+0.3 MJ ME) and feed eaten (+3%) on a 200ha farm with pastures producing 15,000 kgDM/ha/year as shown in Table 1.

Table 1: The value of improved grazing residuals on a 200ha dairy farm.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Amount</th>
<th>Pasture grown</th>
<th>Extra</th>
<th>Extra MS*</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in ME</td>
<td>Extra 0.3MJ ME/kgDM</td>
<td>3,000,000 kgDM (200ha x 15,000kgDM/ha)</td>
<td>900,000 MJME (3,000,000 kgDM x 0.3 MJ ME)</td>
<td>11,250 kgMS</td>
<td>$67,500 @$6/kgMS</td>
</tr>
<tr>
<td>Increase eaten</td>
<td>Extra 3% eaten</td>
<td>3,000,000 kgDM (3,000,000 kgDM x 3%)</td>
<td>90,000 kgDM (3,000,000 kgDM x 3%)</td>
<td>12,938 kgMS</td>
<td>$77,628 @$6/kgMS</td>
</tr>
</tbody>
</table>

Total income for extra ME + eaten = $145,128

* ME converted to milksolids at 80 MJME/kg MS. Assumed ME of extra pasture eaten of 11.5 MJ ME/kgDM.

Notes:
Is this level of increase possible? Yes, the Lincoln University Dairy Farm (LUDF) increased production by 273 kgMS/ha from 2002/03 to 2003/04, over two seasons with similar conditions, mainly through focusing strongly on pasture management and in particular on residuals.

Pasture management is simple, in theory. There are only three rules:

1. Graze a pasture at the right time with the right stocking rate
2. Take animals off the pasture when the desired residual is attained
3. Repeat steps 1 and 2.

These rules apply in dry conditions. In wet weather the aim should shift to protecting the soil and pasture from damage (see Tip #4). Pasture management is also a cycle (Figure 2), with interdependent steps. Improved pasture quality (ME) is a result of good residuals, which you capture at the following grazing.

![Figure 2: The grazing cycle: the quality of a pasture is the result of the previous grazing.](image)

The key to post-grazing residuals is **consistency**. Some farmers aim to graze to 1500 kgDM/ha, some 1600, others 1700. All these options may be fine, based on the farm system. The correct thing to do is to be consistent, so cows are eating the high quality plant leaf **above** the same residual each grazing.

**Tips for smarter residual management:**

1. Define target residual – Does your whole farm team know what the target residual is? This needs to be clear so it can be consistently achieved by whoever is moving the cows.
2. Have a photo of right residual – This is the easiest way to remember it. Have it in the lunch room, but also on everyone’s phones to use in the paddock.
3. Use a plate meter – These are a great way for your team to objectively discuss a residual, (avoiding the “I think it’s 1500. No, I think it’s 1700” discussions.) Measure it with a plate meter, and then decide what to do.

4. Use 24 hour grazings – Only half as many residuals to get right as 12 hour grazings, reducing the number of decisions and potential for error by half. The science shows milk solid production is equal for 12 versus 24 hour grazings.

5. Have residual as a KPI for those shifting cows – having it as a key performance indicator (KPI) in a job description or contract means it’s non-negotiable for staff to achieve.

6. “What if” options – residuals aren’t always achieved (e.g. old pastures of browntop and cocksfoot make it difficult). Have your options to reset residual when required.

7. Act quickly – If residuals aren’t achieved act quickly to reset them. This might include putting cows back into the paddock, or pre-graze mowing next round.

**Tip #2: Smarter pasture renewal**

In our opinion many paddocks on New Zealand dairy farms aren’t producing to their potential. The farms we analyse show there is **significant** potential for improved profitability from smarter investment in pasture renewal.

Currently there is little analysis of pasture performance occurring on-farm to look at what the right amount of investment in renewal should be. The smart way to determine this is to compare the difference between paddocks on the farm within the same productive area - such as soil type or irrigation type (Figure 3). In this example the darker soil type has paddocks ranging from 18 t DM/ha/year (paddock 5) to 12 t DM/ha/year (paddock 3), showing a potential 6 t DM/ha/year gain for paddock 3.

This paddock data comes automatically from farm walk pasture assessments through software such as ‘Pasture Coach’, ‘AgriNet’ or ‘Minda Land and Feed’.
Figure 3: Annual yield of paddocks across a farm with a dark (better) soil & light (poorer) soil.

The second step is looking at the reasons for the differences in paddock performance, which may be driven by plant species, but there may equally be other factors that need to be addressed such as soil fertility, compaction, drainage or insect damage.

The third step is looking at the cost/benefit for renewal which comes from comparing the cost of doing nothing (not renewing) versus the potential higher DM yield, pasture quality (ME) and better utilisation of new pasture. Just looking at extra yield, new pasture can cost 7c/kgDM if an extra 3 t DM/ha/year can be achieved for a $900/ha investment (Figure 4).

<table>
<thead>
<tr>
<th>Extra grown (t DM/ha/year)</th>
<th>Do nothing</th>
<th>1 t</th>
<th>3 t</th>
<th>5 t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra growth over 5 years</td>
<td>0</td>
<td>+5 t DM/ha</td>
<td>+15 t DM/ha</td>
<td>+25 t DM/ha</td>
</tr>
<tr>
<td>DM lost during renewal</td>
<td>0</td>
<td>-1.5 t</td>
<td>-1.5 t</td>
<td>-1.5 t</td>
</tr>
<tr>
<td>Net increase</td>
<td>0</td>
<td>3.5 t DM/ha</td>
<td>13.5 t DM/ha</td>
<td>23.5 t DM/ha</td>
</tr>
<tr>
<td>Cost of renewal $/ha</td>
<td>0</td>
<td>$900/ha</td>
<td>$900/ha</td>
<td>$900/ha</td>
</tr>
<tr>
<td>Cost c/kg DM</td>
<td>n/a</td>
<td>25 c/kg DM</td>
<td>7 c/kg DM</td>
<td>4 c/kg DM</td>
</tr>
</tbody>
</table>

Figure 4: Cost (c/kg DM) of new pasture for 1 tDM/ha vs 3 tDM/ha vs 5 tDM/ha per year extra growth.

New pasture at 7c/kgDM is very attractive when imported feed such as PKE costs 30c/kg DM (based on $240/t, 90% DM plus handling costs of 3c/kg DM).
**Tips for smarter pasture renewal**

1. Assess the performance of individual paddocks – this varies greatly. In analyses we have undertaken, there is typically a 100% yield difference between poor performing and high performing paddocks (e.g. 9 t DM/ha to 18 t DM/ha).

2. Look at similar parts of farm – some parts of the farm may be better than others (e.g. soil or irrigation type). Compare paddocks within these parts.

3. Look for low hanging fruit – spend money on the paddocks that are cheap to improve, and potential gains are large.

4. Keep assessing paddock performance – to assess results from renewal. Smart renewal is about repeating what gives a very good return on investment (and not repeating things that don’t work as well).

**Tip #3: Keeping cover in the ‘sweet spot’**

Ryegrass-based pasture has a natural range where it performs best, and we can harvest the most ME/ha from it in our grazing systems. Our role is to keep pasture within this optimal range as in Figure 5. While the ideal range for a diploid perennial ryegrass might be 1500 kgDM/ha to 3200 kgDM/ha, tetraploids keep their palatability up to 3500 kgDM/ha due to their softer stems.

![Figure 5: The optimal pasture cover for diploid perennial ryegrass.](image-url)

Notes:
To keep pasture in this range we need to set targets for average cover through the year, and then monitor against these. Pasture growth rates vary so the key is continually adapting your management to these changes, and handling surpluses (see Tip #5) and deficits. DairyNZ has introduced a ‘Pasture Road Map’ concept as a visual way of setting targets (Figure 6).

![Figure 6: Average pasture cover (APC) from autumn to spring (DairyNZ 2017).](image)

**Tips for keeping cover in the sweet spot**

1. **Set targets for cover through the year** – The DairyNZ Road Map is a good tool for this, and can be put somewhere handy for continual reference.
2. **Monitor regularly** – there is nothing surer than that pasture growth rates will vary, and regular cover assessment allows you to identify and react to this more quickly. Do a farm walk at the same time each week so it becomes a habit.

**Tip #4: Have a wet weather plan**

Tip #1 mentioned achieving consistent residuals in dry conditions, but when it’s wet the aim is to look after your soils and pasture - while feeding stock as best you can.

Damage from pugging, pasture compaction and consolidation is one of the key reasons for poor pasture persistence in the South Island. Treading damage can decrease regrowth by 44% (Pande *et al.* 2000) and severe pugging can kill a pasture completely (Figure 7).

![Figure 7: A pasture three months after pugging behind a break fence.](image)
**Tips for smarter wet weather pasture management**

1. Have a plan that everyone knows – Wet weather will happen, so talk about how to handle it. Have the plan on the wall for everyone to refer to.

2. Day to day is important – Stock management (e.g. spreading stock out, on/off grazing) is important to get right. If you must damage a paddock(s), limit it to poorer paddocks planned for renewal or crop.

3. Wet weather management as a KPI – having it as a key performance indicator (KPI) in a job description or contract means it’s non-negotiable for staff to achieve.

4. Infrastructure? If damage is on-going, would investment into drainage or a feeding pad be warranted?

5. Repair damage quickly – Fixing pugging is a race with the weeds. There is a window of opportunity to fix damage and keep the weeds out and maintain productivity (Figure 8). The solution might be as simple as marking area(s) on a farm map and getting a contractor to under-sow them.

![Figure 8: Pasture composition over time - before and after a pugging event.](image)

Notes:
Tip #5: Identify surpluses & act quickly

Probably the most common issue in pasture management is a surplus, due to a growth rate higher than animal demand. In these cases we need to act, as pasture doesn’t keep in the paddock. Ryegrass tillers keep on growing, older leaves die, daughter tillers are shaded out and ME drops, as does cow intake and milk production. This was well covered at SIDE last year by Donaghy & Clarke (2016).

The aim is to identify a surplus quickly through monitoring (see Tip #3) and act in one of three ways: Do nothing – a good option if you believe growth rates will drop, and pasture quality is still okay so you can graze your way through the surplus. Make silage/baleage or pre-graze mowing.

Make silage/baleage

Making supplement is a good way to remove surplus feed, and to maintain the quality of pastures across the farm. Also the supplement has value to feed out during feed deficit periods.

There is a direct relationship between the yield of pasture and its feed quality (ME) as in Figure 9. Cutting pastures before they reach a yield of 4 t DM/ha (i.e. harvest about 1.5-2.5t DM/ha) produce better feed quality, and baleage of ME 12 can be achieved in good weather. After this, pastures can lose 1 ME unit every 2-3 weeks, as stems, seed heads and dead matter increase.

![Figure 9: The relationship between increasing yield and feed quality in a pasture silage crop.](image)

It is often said that “light crops are expensive in c/kgDM to make”, but we would argue that often it is the heavy crops that cost dairy farm systems, as they make money by getting high quality pasture into cows to optimise conversion to milk solids.

This is illustrated in Figure 10 which shows there may be little difference in total yield between heavy versus light silage crop. Where you make heavy silage there is typically less pasture grazed and pastures are slow to recover - potentially causing of feed deficit.
**Figure 10:** A light versus heavy silage crop – which is smarter in terms of making money?

**Tips for smarter silage/baleage**

1. Light crops = fast regrowth – often in dairy systems we can be in surplus one week and two weeks later be in deficit (and looking to feed out). Light crops mean paddocks are back into the grazing round quickly, in case we need them.
2. Light crops = high ME silage – high ME silage can be used at any time of year, including peak lactation. Its utilisation tends to be very high compared to poor silage improving its efficiency.
3. Have a good contractor relationship – if you are reliant on a contractor turning up when you need them, keep a good relationship with that person.

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**Notes:**
4. When in doubt book the contractor – silage isn’t silage until it is baled, and you can cancel the contractor and open the paddock up and graze it.

**Handle a surplus by pre-graze mow**

There has been a lot of publicity around pre-grazing mowing, and its effect on milksolids’ production, particularly around the LUDF. It is unclear whether making silage or pre-graze mowing are more profitable, as each has pros and cons.

How the LUDF implements pre-graze mowing is covered in Figure 11, where it used as a way to maintain quality during periods of smaller feed surplus.

![Figure 11: The typical decision process for pre-graze mowing.](image)

**Smarter pre-graze mowing tips**

1. Use in times of pasture surplus – pre-graze mowing speeds the grazing round (the worst thing to do in a feed deficit).
2. Mower leaves the paddock as cows arrive – don’t let the grass wilt for too long, as cows like freshly cut grass.
3. Mow to residual height – at the following grazing, cows will only graze to the mowing height, so mow to your normal grazing residual. Heavy rolling paddocks, to level them, may be needed to achieve this.
References


Donaghy D, Clarke B. 2016. The grass whisperers - making pastures perform for you!


Pande T N, Valentine I, Betteridge K, Mackay A, Horne D. 2000. Pasture damage and
  regrowth from cattle treading. Proceedings of the New Zealand Grassland Association 62:
  155–160.

Notes:
HEALTH AND SAFETY, DOING THINGS RIGHT FOR YOUR PEOPLE

Al McCon
Sector Lead Agriculture, WorkSafe New Zealand

Note

The views expressed in this paper are those of the author.

Introduction

The Health and Safety at Work Act 2015 is now a reality and it clarifies the responsibilities of those involved in workplace activity. One section of the Act is given over to worker engagement, participation, and representation (Health and Safety at Work Act, 2015). This paper examines why worker participation is specifically defined in the Act and why it’s important in all areas of the business.

In New Zealand, it seems the general view of health and safety in the workplace is one of having to comply. Many conversations do not concentrate on the incidence of death, injury or illness as a result of activity while at work. Nor do they consider the impact that workplace harm has on people, families, communities and businesses.

Many New Zealand businesses are relatively small, with the vast majority being owner-operated with less than five employees. It is unfortunate that the impact of the Act on business and lifestyle has been so vastly overstated, especially by some in agriculture. One academic confidently stated that the proposed law would effectively ban children from farms. The reality is the legislation won’t interfere with the good things about being a farmer, and it doesn’t involve a mountain of paperwork. In fact – it may end up saving the farm as well as saving lives.
The context

On 19 November 2010, twenty nine miners lost their lives in the Pike River disaster. As more facts about the mine and its operation became evident, the Government set up an independent taskforce to investigate the state of workplace health and safety in New Zealand.

The report is an indictment of work practices across the country. The summary report states “…the fact is that a lot of bad things happen to people at work in this country. Each year, around 1 in 10 workers are harmed, with about 200,000 claims being made by people to the Accident Compensation Corporation (ACC) for costs associated with work-related injuries and illnesses” (The Independent Taskforce on Workplace Health and Safety: Executive Report. p.10).

The cost of this rate of injury is significant. “Workplace injuries and diseases inflict an enormous emotional toll on the people affected, and significant economic costs on New Zealand. In 2010, the costs were most reliably estimated at $3.5 billion a year (almost two percent of GDP) (The Independent Taskforce on Workplace Health and Safety: Executive Report. p.10).

Less well known, however, is the non-injury toll. “Occupational illnesses have significantly worse human and financial impacts than harm incidents. These illnesses arise from a broad range of poorly-managed hazards in the workplace, resulting in gradual impairment or chronic harm conditions such as cancers and musculoskeletal disorders, and acute harms related to hazardous substance exposures (The Independent Taskforce on Workplace Health and Safety: Executive Report. p.10).

How great is this toll? Estimates are that between 700 and 1000 people die each year from illness caused by workplace conditions, and another 17,000 to 22,000 are incapacitated in some way (see Chart 1). For example, MBIE’s 2010 State of Play report estimated that airborne exposures to harmful substances cause 41% of work-related hospitalisation and 59% of work-related deaths in 2010 (Work-Related Disease in New Zealand: The state of play in 2010. MBIE August 2013).
Chart 1

One model for estimating occupational disease outcomes estimated that in 2010 there were 97 deaths and 670 hospitalisations because of work-related exposures to airborne substances in the agricultural sector (Navigatus Consulting. Simple National Occupational Diseases Estimates). Some will find this number hard to believe. If, however, we look at self-reported occupational exposure (see Table 1) it is clear that exposure to pesticides, dust and noise is common in the sector, and high incidents of associated illness or disease should not be surprising.

Table 1

Notes:
The taskforce points out that five industries – manufacturing, construction, agriculture, forestry and fishing – account for more than half of all workplace injury entitlement claims and have the highest entitlement claim rates (as high as 32 per 1,000 full-time-equivalent employees in the agriculture, forestry and fishing industries).

**Agriculture**

In this paper, Agricultural statistics unless otherwise stated are deemed to consist of land based primary industries excluding forestry. The dataset includes farmers and growers and direct employees, but does not include processing, transportation or contractors. Depending on the season, this mix of horticulture and pastoral farming consists of over 56,000 separate businesses and employs up to 120,000 people. Over the last six years, an average of 19 people have died from injury each year in this sector, and over 25,000 ACC claims have been accepted each year.

The cost to agriculture is huge. The 2014 ACC data shows us almost 27,000 workplace injuries, which are estimated to have a lifetime cost of over $90 million. It is probable that over 800 people are missing every day from New Zealand Agricultural workplaces due to injury that took place at work. Who pays? The sector does with higher ACC levies, the need to employ temporary staff, or trying to work short-handed.

**The fix**

Something has to change – the big question is What? Rob Jager, Chair of the Independent Taskforce, stated in his introduction to the Taskforce Report: “*It will require strong top-down and bottom-up leadership. It will also require a fundamental change to the prevailing ‘she’ll be right’ culture in New Zealand. She most clearly is not all right. Businesses, workers, unions, industry organisations and the Government all have vital and shared roles to play…*” (The Independent Taskforce on Workplace Health and Safety: Report p.5).

Basically, we have to change the ‘safety culture’ on farms. Workplace culture change happens all the time, and there is no reason to believe a change can’t happen in agriculture. In fact, changing culture in a small workplace is far easier than in one with multiple departments on multiple sites. Herein lies the first indication of how change must occur – we can’t set out to change the sector as a whole – we must change every business within the sector.

This may seem like a tall demand given the 56,000 individual businesses across the agricultural sector. Given that WorkSafe has around 100 staff on the ground to cover all 250,000+ businesses in our economy, many would say it is simply impossible.

What WorkSafe brings to the table is a willingness to help support this change by engaging with and helping to educate the sector, and a legislated stick to use where unsafe practice continues. The sector needs to bring a mind-set that people getting hurt or ill because
of workplace activity is unacceptable and effort needs to be put into changing the systems, knowledge, attitude and behaviours that contribute to the current rate. The ultimate outcome is where most people in the sector find unsafe behaviour morally unacceptable.

The fix is in the hands of the people who run farms. Owner-operators, managers, sharemilkers – whoever runs each individual property is the person who can make the biggest difference. The question then remains, what to do, and how?

What will make an impact at an on-farm level? The answer is surprisingly simple – having in place suitable systems and processes, and developing a safety culture – ‘doing things right’ and ‘doing the right things’.

**Beyond compliance**

There appears to be a lack of understanding of the basics of good health and safety practice and how the mechanisms which promote this are the same mechanisms that contribute to overall good business outcomes. Simply seeking to comply with the Health and Safety at Work Act 2015 is not really an option if you want your farm to be a safe, healthy and productive place to work. An attitude of ‘doing it because I have to’ is far removed from having in place the leadership and communication that encourages continuous improvement, innovation, and a positive contribution by all staff.

Simon Herriott of DuPont challenges compliance thinking with his presentation “The Savings of Safety: Leveraging Safety Excellence for Business Excellence. In essence, he argues the processes that encourage good safety (developing the culture and effective management of safety) not only save the direct and indirect costs of the incident and injuries or ill-health, but are the same as those processes that mean you have effective management of the enterprise as a whole – giving business excellence (Herriott).

The DuPont Bradley Curve shows one way of interpreting safety culture by showing four stages. This is shown in Chart 2.
Chart 2

The Bradley Curve was developed from analysis of incidents across many organisations. The curve shows clearly that ‘Safety by Natural Instinct’ more often known in New Zealand as ‘common sense’ is not a solution, even when businesses have compliance as a goal. These organisations have the highest rate of injury from workplace incidents.

Note the vertical scale reads “Injury (or Defect) Rate”. The research in this area shows clearly that the stages here apply as much to other organisational outcomes (such as production and protection of assets) as they do to injury or illness.

Those organisations with the lowest injury rates are organisations with great communication and involvement from everyone in the organisation. These organisations have a proactive approach where problems of any sort are ‘sorted’ before they become problems, because people understand where the organisation is going, and share a vision about how to get there. While this sounds like ‘management consultant speak’ and something for large companies, in reality it is most applicable and much easier to achieve in the very small organisations that characterise farming in New Zealand.

For the purposes of this paper, it is sufficient to note that many resources are available to help farmers develop suitable safety systems. The term ‘suitable’ implies that a system should be customised to the size and type of business. What is suitable for a farm with 20 employees may be overkill for a farm with an owner-operator and a family member. The website saferfarms.org.nz has a large amount of advice, and for those who struggle, there are several reputable providers around the country who can assist in developing the right solution.
Changing culture

While WorkSafe and other organisations can implement programmes of work to assist change and provide sound information around safety management systems and risk management, the reality is that the safety culture on the farm will define how harm free that workplace is. A farm can have in place all the paperwork, signs or systems in the world, but if people aren’t using them then the risk of harm stays high. A safety culture ensures that harm prevention is part and parcel of everything that happens on the farm. A good definition of ‘culture’ in the workplace comes from Schein “…a pattern of shared basic assumptions that a group has learned... These basic assumptions are not readily observable or measurable as they are unconscious, taken-for-granted beliefs that are the ultimate source of values and actions (Schein, 2004).

The fuzziness of the culture concept and the unconscious nature of the basic assumptions make it difficult to influence culture directly (Nielsen, 2014). What seems to be important is people’s perception of the relative priority given to safety versus task completion by those responsible for directing work (Zohar) Basically, the boss and those who direct work set the tone for safety actions.

This approach to change is primarily leader-based, as it focuses on the pivotal role of leaders in creating cultural change. This is not surprising, as the boss’s commitment to safety is generally acknowledged as a fundamental aspect of successful safety performance. But you can’t achieve cultural change just by telling people what to do or giving them a piece of paper with it written on it, because it involves complex social processes. The change emerges out of the interactions between the people on the farm, who says what, who does what, who sees what. The boss has the opportunity to influence the change process by enabling and focusing the interaction between individuals (Marion et al.)

Gerard et al. have drawn from a huge body of work that examines health and safety literature. Interestingly enough, the concepts are the same as those drawn from research into what motivates people at work. Why is this important? Because well-motivated people work differently. They tend to expend more discretionary effort – that is, go beyond the minimum expected of them. The upshot for a business here is that the things that develop great safety

Notes:
culture also develop great work cultures. A staff member who feels capable and able to speak up about one thing (eg a new risk) will transfer that ‘permission’ to other things (eg, improvements to process).

We have all heard the complaints about finding well-motivated staff. So keeping those who have potential to be good workers becomes very important, especially as a farm puts effort into developing them. Having a farm culture (we can drop the ‘safety’) that follows the core values will considerably enhance worker satisfaction and motivation, which in turn will mean better retention of staff.

In fact, the biggest organisational cause of disengagement is incompetent leadership. Basically, as a manager, it's how you act with and around staff that will have a significant impact on whether they are engaged at work, or not.

**The Business Effect**

There are two reasons why having the right culture is important. It protects the people on the farm, and it protects the business.

Herriott shows the impact of the avoiding incidents on savings in Figure 3.

![The real iceberg](image)

**Figure 3**

We have seen similar results in New Zealand by working the other way. Good business practice equates to good health and safety outcomes. DairyNZ worked with Synlait Farms and other farms in Southland to trial ‘Lean’ management practices. Among the results, lower turnover rates, lower number of hours worked, less cluttered work environments, better communication, and better maintenance – all precursors to lower incident rates (and, as it turns
out, higher production rates) (Inside Dairy, 2016) They are now continuing that work with the FarmTune programme.

Creating the culture

Here’s a good start point for any leader – what experiences have you had that you can draw from. If you had a great job, what made it great? If you had a really bad one you couldn’t wait to leave, why was that? Chances are some of those things will resonate with your team too. The bottom line – people want to feel valued and challenged; they want to be trusted and given the freedom to explore and learn within the job. However, don’t expect people to behave like you do, or respond to things like you do.

Team is the operative word. Yes, you may be the employer, and they may be ‘staff’, but you’re all part of the same team, so act like it. Rallying around the idea “we’re all in this together” builds a sense of unity and community, which fosters culture. No one has sole ownership of good ideas. Utilise those other brains that work with you.

Are you engaged? People will practice what they see. Are you having fun? Can they see it? Fun is you laughing, joking and celebrating WITH your team. Get to know them and hear their stories. When you engage with them personally, they become engaged work-wise as well. Learning about them will allow you to see what motivates them.

So when developing culture, talk with each other. Easy to say, but hard to do. People need to trust that their opinion will be respected and there won’t be ridicule or comeback for expressing views. That doesn’t mean everyone has to agree – it means that any response is done in such a way that more considered views are openly shared in the future. People need to be able to share their ideas and speak openly without fear of repercussion. People want their opinions heard, and they want to feel good.

Coach people, using feedback as a tool. Positive feedback should be given right away, to encourage more of the same performance. Say “Thank you!” for a job well done. It’s a powerful motivator, and should be done often—in person if possible. Negative feedback should also be given a.s.a.p., so workers have the opportunity to self-correct. The secret is to have a discussion, and pinpoint what needs to be improved and how that can be done.

Notes:
When problems arise, examine the circumstances, understand the context, and only then pass judgment. Respect and trust your team and you will get the same in return. If you make a mistake, apologize and admit you were wrong. This will allow your employees to relate to you better, and they will appreciate your honesty.

Try to get everyone engaged in planning and decision-making. That way the results become their baby too: something they’re willing to strive for. To do this, whenever possible, ask for input and use their ideas. This way, they have a vested interest in seeing the project succeed. This can not only empower and motivate employees, it can also lead to new and more productive ways of working.

Work is like exercise. People stop doing it when they don't see great results. The reason usually is, because they aren't pushing themselves hard enough, and/or because the results aren’t visible. Don’t be afraid to push the team, because when they accomplish great things, it’s all worth it. If the team isn’t accomplishing anything, you either have the wrong people or the wrong plan.

To keep employees engaged, they have to feel like they are more than just a number and that’s done by letting them know what’s going on. People are engaged with leaders who share, sacrifice and communicate- and hold themselves accountable when they didn’t make the right decision.

To create a culture, get to know those who work on the farm, show them respect and trust, learn what motivates them. Encourage them to speak up about things that can be done better, get them involved in planning for the future, keep them informed and let them push themselves.

Mix this culture with good systems and processes (production, safety) and the farm will start to fly.

**Summary**

New Zealand businesses, of all sizes, are generally poor at determining and controlling health and safety risks associated with their business. The overall impact of this is high work-related illness, injury and mortality rates. Agriculture is one of the worst sectors.

The underlying culture in the agriculture sector seems to be one of acceptance of injury and illness as an unavoidable consequence of doing business. There is a huge reliance on ‘common sense’ to deal with risk.

There is good evidence that change has to be driven from within the farm, not from WorkSafe or any other external body. One very powerful reason for this change is that adoption of the culture, systems and processes that underlie good health and safety practices creates a stronger business, because that culture, and those systems and processes, are the same as those that lead to business excellence.
Is compliance with the Health and Safety at Work Act 2015 an option? No, it’s compulsory. And it won’t interfere with the good things about being a farmer, and it doesn’t involve a mountain of paperwork.

Are safety systems and processes enough? No, because once the basic systems and processes are in place, they need an ongoing commitment by everyone on the farm to make them work. And the secret to getting that commitment? A workplace that has engaged and motivated people, the result of good on-farm leadership.

References

Health and Safety at Work Act 2015. Part 3


Inside Dairy, February 2016.


Navigatus Consulting. Simple National Occupational Diseases Estimates


Cost Control in a Large Scale Dairy Business

Armer Group & Dairy Holdings Limited

Lincoln University

28th June 2017
INTRODUCTION

• Armer Group History & Overview

• Dairy Holdings History & Overview

• Science & the Farming System

• Guiding Principles for Growth

• Costs

• General Farming Policies
Armer Group – History

- Started share-milking 140 cows some 30 years ago
- Started with zero capital
- Today we own 15 Large Scale dairy farms 500 to 1,200 cows
- Produce 3.7 million milk-solids in the North Island NZ
- Own support land to be self sufficient approx 2,000ha
Armer Group - Overview

• Colin and Dale - Sole Shareholders and Directors
• General Manager of Armer Group - Robert McPherson
• Reporting functions as if corporate entity
• Dairy Farms run by Contract Farmers (self-employed for risk and reward)
• Support land is run by salaried managers
• All farms are Spring calving
Dairy Holdings Limited - History

- Founded in 2001. Shareholders introduced capital of 45m
- Initial farms purchased from corporates: TasAg & Dairy Brands
- Low 2003 milk price drove profit focus
- 2008 - repaid $54m shareholder capital
- 2012 - shareholder change to 3 long term farming families
- 2014 - paid $80m to shareholders
- 2013 to 2017 – completed farm development programmes
- 2017/18 – self contained for all young stock, bull & cow wintering
- Today in excess of $850 million capital employed
- Gearing levels under industry average
- Armer’s share moved from 16.67% to 37.08%
Dairy Holdings Limited - Shareholders

- Jagewi Limited: 34.79%
- Dacca Investments Limited: 37.08%
- Turdair Holdings Limited: 28.13%
Five Directors – Two Independent, Three Shareholders

The Board:
- Greg Gent – Independent Chairman
- Chris White – Independent Director
- Colin Armer – Founding Director and representative of Dacca
- Harry Snell – Representative of Jagewi (JD & RD Wallace)
- Murray Turley – Representative of Turdair Holdings

Four meetings per annum, one aligned with Management meeting.
One strategy meeting if required.
Conference calls as required.

Directors’ responsibilities are to the Company, not necessarily the shareholders.
Dairy Holdings Limited – Management Team

- The right people, culture and maintaining their involvement in the vision is the key.
- Chief Executive
- 3 Farm Operations Managers (Graeme, Gary & Kieran) – extensive hands on experience over more than 20 years each.
- 4 Farm Supervisors (Garth, Mick, Bryson and Don) - all “hands on” and have sound understanding of science and financial performance.
- Farm Practice Advisor
- Contracting Manager
- Sustainability, Health & Safety Manager
- Chief Financial Officer
- Financial Controller
- Farm Operations Managers – oversee about 13 farms each (about ½ are herd owning)
- Farm Supervisors – oversee about 6-8 farms each (typically operate one farm themselves)
Dairy Farm and Grazing Block Locations

Springs Junction/Murchison

Canterbury

North Otago

West Otago / Southland
Progression is constant and dynamic.
Growth for Operators slowed by current economic conditions.
Growth in leased cows due to increase in Contract Milkers in the 2016/17 season.
Their will always be opportunities for top performers
## Budgeted Production
### 16/17 Season

<table>
<thead>
<tr>
<th></th>
<th>No. of Farms</th>
<th>Area (Kg MS '000)</th>
<th>Milking Cows (Kg MS '000)</th>
<th>Production (Kg MS/Ha) FY16</th>
<th>Production (Kg MS/Ha) FY15</th>
<th>Production (Kg MS/Ha) FY14</th>
<th>Production (Kg MS/Ha) FY13</th>
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<tr>
<td>Grazing Blocks</td>
<td>17</td>
<td>4,868</td>
<td>-</td>
<td>741</td>
<td>679</td>
<td>602</td>
<td>612</td>
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<tr>
<td>West Coast</td>
<td>5</td>
<td>1,690</td>
<td>4,260</td>
<td>1,253</td>
<td>679</td>
<td>602</td>
<td>612</td>
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<tr>
<td>Managed Farms</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Contract Milked</td>
<td>40</td>
<td>8,887</td>
<td>31,715</td>
<td>1,257</td>
<td>1,218</td>
<td>1,175</td>
<td>1,085</td>
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<tr>
<td>Lower Order</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lower Order &gt; 50% Cows</td>
<td>9</td>
<td>2,307</td>
<td>8,155</td>
<td>3,021</td>
<td>1,309</td>
<td>1,255</td>
<td>1,403</td>
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<tr>
<td>Lower Order &lt; 50% Cows</td>
<td>2</td>
<td>567</td>
<td>2,200</td>
<td>805</td>
<td>1,420</td>
<td>1,158</td>
<td>1,280</td>
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<tr>
<td>50:50</td>
<td>2</td>
<td>439</td>
<td>1,680</td>
<td>615</td>
<td>1,401</td>
<td>1,353</td>
<td>1,257</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75</strong></td>
<td><strong>18,758</strong></td>
<td><strong>48,010</strong></td>
<td><strong>16,868</strong></td>
<td><strong>1,214</strong></td>
<td><strong>1,131</strong></td>
<td><strong>1,123</strong></td>
</tr>
<tr>
<td><strong>Total Excluding West Coast</strong></td>
<td><strong>70</strong></td>
<td><strong>12,200</strong></td>
<td><strong>43,750</strong></td>
<td><strong>15,615</strong></td>
<td><strong>1,280</strong></td>
<td><strong>1,194</strong></td>
<td><strong>1,198</strong></td>
</tr>
</tbody>
</table>
Dairy Holdings Limited – Overview

The graph shows the total 10-day production of milk solids from August 2011 to August 2020. Each year is represented by a different line, with the most recent year being 2016/17 and the earliest being 2011/12. The production peaks in the middle of the year, with a noticeable decrease in the latter part of the year.
Dairy Holdings Limited – Overview

Heifer Grazing
• 9,000 R1 heifers and 8,000 R2 heifers on Canterbury rearing blocks

Bulls
• 1,200 service bulls
• 500 high BW yearling Jersey bulls & 800 AB bred bull calves

Winter Grazing

<table>
<thead>
<tr>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>External Grazing</td>
<td>-</td>
<td>3,748</td>
<td>10,361</td>
<td>10,782</td>
<td>11,471</td>
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<tr>
<td>DHL Farms &amp; Grazing Blocks</td>
<td>51,013</td>
<td>46,789</td>
<td>38,125</td>
<td>36,070</td>
<td>33,945</td>
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<tr>
<td>Total Start Cows</td>
<td>51,013</td>
<td>50,536</td>
<td>48,486</td>
<td>46,852</td>
<td>45,416</td>
</tr>
</tbody>
</table>

Contracting
• 3,000 ha fodderbeet, kale, swedes & oats/grass
• 2,000 ha regrassing
Science and the Farming System  
– The Science

- Observed Applied Science from research stations
- The things that we adopted and adapted to suit large and multiple farms:
  - Spring Rotation Planner
  - Use it or Lose It (Dr Kevin MacDonald)
  - Stocking Rate and Calving Dates (Clayton and Dr Bryant)
  - Long Grazing Rotation lengths
  - Strong focus on Grazing management
  - Non Cyclers Do cycle (Vet club trial)
Spring Planner

* Strict discipline around area used when Grass Supply is less than Cow Demand

Example: 100 ha farm
Science and the Farming System – The Farm System

• Scientific research provided basis for profitable dairy farming knowledge
• Early culling and progressive dry off to achieve C/Score targets
• Pasture cover targets are critical 31 May (2300)
• Above average comparative stocking rates = (high pasture utilisation)
• Calve early (compared to districts we farm in)
• Low feed input model
• High EBIT per hectare focus
• Built a scalable repeatable farm system
### Farm System - example

<table>
<thead>
<tr>
<th></th>
<th>District Average - Taupo</th>
<th>Armer Farms - Taupo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mid Point Calving</strong></td>
<td>19(^{th}) August</td>
<td>5(^{th}) August</td>
</tr>
<tr>
<td>Stocking Rate per ha (cows)</td>
<td>2.8</td>
<td>3.3</td>
</tr>
<tr>
<td>Days in milk per ha by 31(^{st}) January</td>
<td>462</td>
<td>590</td>
</tr>
</tbody>
</table>
Benchmarking Example (Coastal BOP)

<table>
<thead>
<tr>
<th></th>
<th>Armer Farms</th>
<th>Dairy Base (54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows per Ha</td>
<td>3.9</td>
<td>3.0</td>
</tr>
<tr>
<td>Kgs of M/S Ha</td>
<td>1105</td>
<td>1066</td>
</tr>
<tr>
<td>Income per Ha</td>
<td>$7029</td>
<td>$7361</td>
</tr>
<tr>
<td>FWE per Ha</td>
<td>$3601</td>
<td>$5433</td>
</tr>
<tr>
<td>Feed Costs</td>
<td>$663</td>
<td>$1561</td>
</tr>
<tr>
<td>EBIT per Ha</td>
<td>$3428</td>
<td>$1928</td>
</tr>
<tr>
<td>Pasture eaten</td>
<td>15.4 tonnes</td>
<td>12.6 tonnes</td>
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</table>
Guiding Principles for Growth
- The Farm

- High pasture utilisation (cheapest feed)
- Moderate animal performance
- Sound understanding of the Science (to produce profit)
- Minimise depreciating assets
- Uncomplicated farm systems where operators can generate consistent profits and have a life
Guiding Principles for Growth
- The Business

- Control - as many costs up and down the supply chain as possible (invest in the entire supply chain). Quantity as important as price.
- Career Progression – opportunity to grow & a fair wage
- Growth – positive environment & retains staff
- Surplus Cows – high in-calf rates makes growth easier
- Consistent Performance – bankable for owner and sharemilker
- People – best employers have attention to detail and develop their own staff
- Culture is King – frugal, tidy and responsible/accountable
- EBIT and Benchmarking – the most important KPI
 Costs
- Competitive Advantage is Eroding

Figure 2: Farmgate milk production costs in selected countries, 2006-2012
US cents/litre

Source: OnFarm Consulting, DairyNZ, LEI, Teagasc, FADN, Genske Mulder, Rabobank, 2013
Costs
- The NZ Dairy Industry
An Industry That Lost its Way

Source: DairyNZ Economics Group
Costs
- Armer Group
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Milksolids kgMS</td>
<td>289,502</td>
<td>328,161</td>
<td>276,032</td>
<td>309,253</td>
<td>234,451</td>
<td>256,713</td>
</tr>
<tr>
<td>Ha</td>
<td>355</td>
<td>355</td>
<td>360</td>
<td>360</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>Farm Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Milk Income</td>
<td>1,675,874</td>
<td>1,121,987</td>
<td>1,585,346</td>
<td>1,064,136</td>
<td>1,350,383</td>
<td>882,236</td>
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<tr>
<td>Industry Levy</td>
<td>- 12,038</td>
<td>- 11,814</td>
<td>- 8,388</td>
<td>- 12,549</td>
<td>- 8,424</td>
<td>- 9,279</td>
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<td>Livestock</td>
<td>135,920</td>
<td>134,810</td>
<td>108,648</td>
<td>121,670</td>
<td>99,461</td>
<td>81,450</td>
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<tr>
<td>Total Farm Income</td>
<td>1,799,756</td>
<td>1,244,983</td>
<td>1,685,606</td>
<td>1,173,257</td>
<td>1,441,420</td>
<td>954,407</td>
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<tr>
<td>Fonterra Dividend</td>
<td>48,512</td>
<td>145,535</td>
<td>44,003</td>
<td>132,008</td>
<td>40,913</td>
<td>122,740</td>
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<td>Total Income</td>
<td>1,848,268</td>
<td>1,390,518</td>
<td>1,729,606</td>
<td>1,305,265</td>
<td>1,482,333</td>
<td>1,077,147</td>
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<tr>
<td>Less Direct Farm Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries &amp; Wages</td>
<td>332,902</td>
<td>377,385</td>
<td>317,404</td>
<td>355,101</td>
<td>268,804</td>
<td>296,217</td>
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<tr>
<td>Animal Health</td>
<td>34,513</td>
<td>41,134</td>
<td>27,397</td>
<td>39,176</td>
<td>33,621</td>
<td>28,167</td>
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<td>Breeding Expenses</td>
<td>19,014</td>
<td>16,817</td>
<td>16,788</td>
<td>21,597</td>
<td>12,903</td>
<td>15,727</td>
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<td>Shed Expenses</td>
<td>13,919</td>
<td>18,651</td>
<td>14,076</td>
<td>18,825</td>
<td>58,558</td>
<td>14,572</td>
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<td>Calf Expenses</td>
<td>941</td>
<td>998</td>
<td>3,871</td>
<td>1,747</td>
<td>1,441</td>
<td>771</td>
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<td>Fertiliser</td>
<td>288,140</td>
<td>208,341</td>
<td>210,641</td>
<td>197,364</td>
<td>141,896</td>
<td>122,722</td>
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<td>Grazing</td>
<td>136,070</td>
<td>190,824</td>
<td>118,321</td>
<td>166,530</td>
<td>233,007</td>
<td>263,124</td>
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<tr>
<td>Supplements &amp; Cropping</td>
<td>10,148</td>
<td>15,229</td>
<td>2,126</td>
<td>4,120</td>
<td>935</td>
<td></td>
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<tr>
<td>Farm Working</td>
<td>24,681</td>
<td>9,764</td>
<td>16,499</td>
<td>14,049</td>
<td>1,410</td>
<td>293</td>
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<tr>
<td>Vehicles</td>
<td>12,538</td>
<td>3,832</td>
<td>18,606</td>
<td>8,773</td>
<td>8,427</td>
<td>7,929</td>
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<tr>
<td>Repairs &amp; Maintenance</td>
<td>9,328</td>
<td>21,407</td>
<td>16,824</td>
<td>3,777</td>
<td>35,908</td>
<td>1,945</td>
</tr>
<tr>
<td>Direct Farm overheads</td>
<td>17,739</td>
<td>25,013</td>
<td>16,589</td>
<td>21,322</td>
<td>12,166</td>
<td>17,376</td>
</tr>
<tr>
<td>Total Farm Expenses</td>
<td>899,933</td>
<td>929,395</td>
<td>779,142</td>
<td>852,381</td>
<td>808,141</td>
<td>769,778</td>
</tr>
<tr>
<td>Farm EFS (EBITDA)</td>
<td>948,335</td>
<td>461,123</td>
<td>950,467</td>
<td>452,884</td>
<td>674,192</td>
<td>307,369</td>
</tr>
<tr>
<td>Farm EBITDA (EFS)/ha</td>
<td>2,671</td>
<td>3,832</td>
<td>3,832</td>
<td>8,773</td>
<td>8,427</td>
<td>7,929</td>
</tr>
<tr>
<td>Depreciation</td>
<td>53,143</td>
<td>48,239</td>
<td>61,993</td>
<td>55,765</td>
<td>9,048</td>
<td>8,125</td>
</tr>
<tr>
<td>Farm EBIT (EFS)/ha</td>
<td>2,522</td>
<td>1,633</td>
<td>2,468</td>
<td>1,103</td>
<td>2,558</td>
<td>1,151</td>
</tr>
<tr>
<td>Total Farm Costs per kgMS</td>
<td>3.11</td>
<td>2.89</td>
<td>2.82</td>
<td>2.76</td>
<td>3.45</td>
<td>3.00</td>
</tr>
</tbody>
</table>
## Costs
- Dairy Holdings Limited

<table>
<thead>
<tr>
<th></th>
<th>Canterbury Surface Water</th>
<th>Canterbury Ground Water</th>
<th>Waitaki Borderdyke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kg MS / Ha</td>
<td>1,375</td>
<td>1,471</td>
<td>1,155</td>
</tr>
<tr>
<td>Contract Milker</td>
<td>1.40</td>
<td>1.40</td>
<td>1.49</td>
</tr>
<tr>
<td>Animal Health</td>
<td>0.13</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Breeding</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.07</td>
<td>0.18</td>
<td>0.00</td>
</tr>
<tr>
<td>Grazing (internal)</td>
<td>0.82</td>
<td>0.80</td>
<td>0.89</td>
</tr>
<tr>
<td>Feed incl N</td>
<td>0.27</td>
<td>0.27</td>
<td>0.34</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>0.15</td>
<td>0.15</td>
<td>0.18</td>
</tr>
<tr>
<td>Weed &amp; Pest</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>R &amp; M</td>
<td>0.24</td>
<td>0.25</td>
<td>0.15</td>
</tr>
<tr>
<td>Standing Charges</td>
<td>0.20</td>
<td>0.08</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Total 2016/17</strong></td>
<td><strong>3.37</strong></td>
<td><strong>3.34</strong></td>
<td><strong>3.46</strong></td>
</tr>
<tr>
<td><strong>Total 2015/16</strong></td>
<td><strong>3.50</strong></td>
<td><strong>3.53</strong></td>
<td><strong>3.58</strong></td>
</tr>
</tbody>
</table>
General Farming Policies

Defer Supplement to Last Minute

- Consistently supported by research.
- Puts the business under pressure.
- Reduces substitution.
- Can take advantage of favourable conditions.
- Make sure there is a Plan B.
- Adopt an approach of minimising the conservatism in the business and carry little feed on hand.
General Farming Policies

- **Animal Health** - Minimal except mastitis (indicator of management)
  - Strong KPI - BSCC to EBIT

- **Breeding** - AB 4 weeks, 10 weeks mating, bulls at 4:100.
  - Heifers calve week before cows.
  - Herd Testing only if able to cull based on the results.

- **Irrigation** - Surface in preference to bores.
  - Reliability, timeliness, volume at peak is everything.
  - Electricity contracts Dec to April.

- **Tidy farms** - Lower R&M costs.
General Farming Policies

- **Wintering**
  - Fully self contained with own contracting & spraying business
  - Beet, Kale & Swedes
  - 1/6th start cows wintered on-farm. Heifers.
  - 8 weeks off.

- **N**
  - Target little and often (1 kg N/ha/day in growing season).
  - Apply behind cows, every rotation, but vary application rate.

- **Fertiliser**
  - Soil test monitor paddocks annually, WFT every 5 years.
  - Maintenance to achieve Olsen P 30, pH 5.8.

- **Contract Milkers / LOSM.**
  - Build equity on the same farm.
  - Consolidated herds, builds capability, less changeovers, stronger communities.
Summary

• A resolve to drive profit not production will lead to prosperity
• The science is proven and available
• Profitability through people management, a systemised approach, and high pasture harvested have enabled the Armer Group & Dairy Holdings businesses to grow and prosper. This leaves the businesses well placed to deal with the challenges into the future.

• What are you going to do about it?
Introduction

Reducing the environmental impacts of the dairy industry in New Zealand has become a key focus with increasing interest surrounding nitrogen (N) leaching issues (Bryant et al., 2007, Woodward et al., 2013). Regional Councils throughout New Zealand have been developing regulations that place a limit on the amount of nitrate-N (NO$_3^-$-N) leached from agricultural land. Nitrogen from urine patches is a major contributor to N leaching, due to the high loading rate of N in urine patches compared with the capacity of many plant species to take up N (Cameron et al., 2013). There are several ways in which plants and management strategies can be used to reduce nitrate leaching losses without impinging production. The Forages for Reduced Nitrate Leaching (FRNL) programme is investigating several strategies including:

- using forages to increase N uptake from the urine patch once the urine is deposited on the soil surface
- using efficient irrigation to optimise pasture production and N uptake from the soil
- identifying forage types and N fertiliser rates which optimise production whilst reducing plant N concentration
- growing forages that lead to livestock excreting urine with a lower concentration of N, and
- identifying management practices which optimise production from alternative pasture types which reduce urinary N.

Effects of forage type on N leaching losses

*Roshean Woods*

One approach to mitigation of N leaching losses is to increase the uptake of N by forage plants, particularly during the cooler seasons when the risk of leaching is greatest. In grazed systems, if plants can utilize urine-N more efficiently at these times of the year, the N lost to

Notes:
drainage water could be reduced. Using lysimeters we measured N leaching losses from urine patches deposited onto the commonly used perennial ryegrass-white clover forage mixture, and some alternative forages: Italian ryegrass, lucerne, and an Italian ryegrass-plantain-white clover mixture.

Results showed N leaching losses for control (non-urine) lysimeters were minimal (<2.2 kg N/ha). When urine was applied, total N leaching losses were 35% lower ($P < 0.1$) from Italian ryegrass (133 kg N/ha) and 99% greater ($P < 0.001$) from lucerne (407 kg N/ha), when compared with perennial ryegrass-white clover (205 kg N/ha) (Fig 1) (Woods et al., 2016). The reduction in N leaching for Italian ryegrass, was attributed to it having taken up more N during the winter with 2.1 kg N/ha/day taken up on average, compared with 1.6 kg N/ha/day for perennial ryegrass-white clover, and 0.3 kg N/ha/day for lucerne. Herbage dry matter (DM) yields for the 17-month experimental period were 24 T DM/ha for perennial ryegrass-white clover, 21 T DM/ha for Italian ryegrass and 25 T DM/ha for lucerne (Woods et al., 2016). Please note that we have identified some limitations in the measurement technique used to determine N leaching losses from lucerne due to its deep rooting capability and further research is needed in this area for grazed lucerne stands (see Woods et al. (2016) for more detail).

![Figure 1](image_url): The grazing cycle: the quality of a pasture is the result of the previous grazing. Figure 1: Total mineral nitrogen (nitrate + ammonium) leaching loss (kg N/ha) from lysimeters for the experimental period: 7 May 2014 to 1 October 2015. Forages were treated in May 2014 with (■) or without urine (■) (at 700 kg N/ha).

Initial results of a second study, show N leaching losses to be around 45% lower from urine (700 kg N/ha) deposited onto an Italian ryegrass-plantain-white clover mixture, compared with...
perennial ryegrass-white clover. This appears to be again attributed to greater cool-season N uptake. In another treatment, we took into account the N concentration of the urine excreted by dairy cows grazing each of the two forages, and found this was lower for the Italian ryegrass-plantain-white clover mixture (508 kg N/ha) than the perennial ryegrass-white clover (664 kg N/ha). For this treatment, initial N leaching losses were shown to be 89% lower for the Italian ryegrass-plantain-white clover mixture, compared with perennial ryegrass-white clover. There was no difference in herbage DM yield between the two forages. These data will be confirmed once the experiment has been completed.

This research has shown that it is possible to reduce urine patch N leaching losses by optimizing forage growth and N uptake using alternative forages which are more winter-active or reduce urine-N excretion. These are potential tools which farmers could use to reduce N leaching losses into the future.

**Effects of irrigation management on N leaching losses**

*Anna Carlton*

Irrigation management is another proposed mitigation option to reduce N leaching losses through increased plant growth and thus N uptake over the summer period. Of key interest is how these diverse forages respond to irrigation and whether they can be used to reduce N leaching losses. The objective of this study was therefore to quantify the effect of ‘optimum’ vs. ‘deficit’ irrigation management regimes on N uptake by diverse and standard forages, and on N leaching losses from spring deposited urine.

Using lysimeters, we measured plant N uptake and N leaching losses from urine patches deposited onto a ‘standard’ perennial ryegrass and white clover forage and a ‘diverse’ forage containing perennial ryegrass, white clover, red clover, prairie grass, plantain and chicory. Following urine application, irrigation water was applied at optimum vs. deficit rates from November to March. Treatments are outlined in Table 1.
Table 1: Description of lysimeter treatments.

<table>
<thead>
<tr>
<th>Treatment No.</th>
<th>Irrigation Regime</th>
<th>Irrigation Rate (mm)</th>
<th>Pasture Species</th>
<th>Treatment (kg N ha(^{-1}) yr(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Deficit</td>
<td>9 mm, 3 d</td>
<td>Standard</td>
<td>700</td>
</tr>
<tr>
<td>2</td>
<td>Deficit</td>
<td>9 mm, 3 d</td>
<td>Diverse</td>
<td>700</td>
</tr>
<tr>
<td>3</td>
<td>Deficit</td>
<td>9 mm, 3 d</td>
<td>Standard</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>Deficit</td>
<td>9 mm, 3 d</td>
<td>Diverse</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>Optimum</td>
<td>18 mm, 3 d</td>
<td>Standard</td>
<td>700</td>
</tr>
<tr>
<td>6</td>
<td>Optimum</td>
<td>18 mm, 3 d</td>
<td>Diverse</td>
<td>700</td>
</tr>
<tr>
<td>7</td>
<td>Optimum</td>
<td>18 mm, 3 d</td>
<td>Standard</td>
<td>500</td>
</tr>
<tr>
<td>8</td>
<td>Optimum</td>
<td>18 mm, 3 d</td>
<td>Diverse</td>
<td>500</td>
</tr>
</tbody>
</table>

Initial results suggest that low N leaching losses occur from urine deposited in late spring. At a N loading rate of 700 kg N/ha, initial N leaching losses under optimum irrigation were shown to be approximately 88-97% lower than those from deficit irrigation. This appears to be attributed to greater herbage growth and N uptake during the summer period by forages receiving optimum irrigation. There was no apparent difference in N leaching losses between diverse and standard pastures. These data will be confirmed once the trial has been completed. The results from this trial demonstrate that adequate moisture over summer improves soil N use by plants and reduces N leaching from spring deposited urine in grazed pastures.

**Effects of N fertiliser on yield and plant N content**

*Kirsty Martin*

An approach to increase pasture production while achieving environmental targets associated with lower N leaching is to identify forages that grow more at a reduced annual application of N fertiliser. While N fertiliser responses have been well described for grasses (Hill et al., 2005, Mills et al., 2009), less information is available for alternative legume and herb species. A field study was conducted on the Canterbury Plains, New Zealand over 12 months. Six species (perennial ryegrass, Italian ryegrass, white clover, lucerne, chicory and plantain) were grown under irrigation and cut and carry management at six annual N-fertiliser rates ranging from 0 to 450 kg N/ha/year.

Results indicated that, at all N fertiliser rates, Italian ryegrass and plantain were higher yielding than perennial ryegrass (9.9 and 10 T DM/ha/year vs 7.7 T DM/ha/year, Fig 2(Martin et al., In press)). Above application rates of 180 kg N/ha/year, N content increased significantly in both grasses and herbs, (2.4 – 2.8 % of DM in grasses, 2.9 – 3.3 % of DM in herbs, Fig 3). Forages
with high N content often result in higher N intake and increased risk of urinary N loss. A higher N content in white clover and lucerne (4.3 % of DM) compared to herbs and grasses (3.1 and 2.6 % of DM) suggest legumes in pastures are likely to be a contributor to high N in the diet (Fig 3) however, it is important to note that most dairy pastures contain less than 20 % clover content.

**Figure 2:** Total annual yield (T DM/ha/year) of perennial ryegrass (―●―), Italian ryegrass (---○---), white clover (---■---), lucerne (---□---), chicory (---▲---) and plantain (---∆---) at six N fertiliser rates ranging from 0 to 350 kg N/ha/year. LSDs from ANOVA for main effects species, N fertiliser rate and the interaction are shown as error bars. LSD = least significant difference (α=0.05).
Figure 3: Average annual N concentration (% of DM) of perennial ryegrass (–●–), Italian ryegrass (–○–), white clover (–■–), lucerne (–□–), chicory (–▲–) and plantain (–∆–) at six N fertiliser rates ranging from 0 to 350 kg N/ha/year. LSDs from ANOVA for main effects species, N fertiliser rate and the interaction are shown as error bars. LSD = least significant difference ($\alpha=0.05$).

**Plantain for reduced N loading in the urine patch**

**Lisa Box**

Previous studies have demonstrated that cows grazing ‘diverse’ pastures containing herbs (plantain and chicory) excrete urine which has lower N concentrations compared with cows grazing standard perennial ryegrass-white clover pastures (Bryant et al., 2017, Totty et al., 2013). More recent experiments have focussed specifically on feeding plantain as a strategy to reduce nitrogen excretion (Box et al., 2016). At Lincoln University, milk production and urinary N concentration were measured in two experiments in early and late lactation dairy cows grazing a perennial ryegrass-white clover pasture, pure plantain, or a pasture comprised of 50% perennial ryegrass-white clover and 50% pure plantain by ground area. All cows were offered a similar herbage allowance.

In late lactation daily milksolids production per cow was 0.17 kg MS greater for cows grazing plantain than cows grazing pasture, with cows grazing 50-50 pasture-plantain intermediate (Table ). A striking result was that the urine-N concentration was over 55% lower for plantain and about 33% lower for 50-50 pasture-plantain than pasture in both experiments (
Table 1. Previous studies have shown that the excretion of N in urine is linearly related to N intake (Tas et al., 2006). However, in this experiment there was no difference in apparent N intake between pasture and plantain. Despite some indication of increased urine volume for cows with plantain included in their diet, there was a reduction in total N output. Using an average urination volume and assuming a patch size of 0.2 m$^2$, the urine N loading from cows on pasture was about 700 kg N/ha in autumn and 670 kg N/ha in spring. With the same assumptions a urine patch from cows grazing plantain would have an N loading of about 450 kg N/ha in autumn and 320 kg N/ha in spring. Applications rates above 500 kg N/ha will likely increase leaching and nitrous oxide emission potential (Groenigen et al., 2010). This shows the potential of plantain to reduce N losses from grazing dairy systems.

Table 2: Mean milk yield and composition of dairy cows grazing perennial ryegrass-white clover pasture, plantain or 50-50 pasture-plantain. LSD = least significant difference ($\alpha = 0.05$). Means followed by different letters denote that values are significantly different at the 5% level

<table>
<thead>
<tr>
<th></th>
<th>Pasture</th>
<th>50-50 pasture-plantain</th>
<th>Plantain</th>
<th>LSD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late lactation (autumn 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk solids (kg/d)</td>
<td>1.50$^a$</td>
<td>1.60$^{ab}$</td>
<td>1.67$^b$</td>
<td>0.08</td>
<td>0.012</td>
</tr>
<tr>
<td>Milk protein (%)</td>
<td>4.28</td>
<td>4.29</td>
<td>4.34</td>
<td>0.09</td>
<td>0.512</td>
</tr>
<tr>
<td>Milk fat (%)</td>
<td>6.16$^a$</td>
<td>5.52$^b$</td>
<td>5.80$^{ab}$</td>
<td>0.23</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Urea N (mmol/L)</td>
<td>11.2$^a$</td>
<td>10.9$^a$</td>
<td>9.96$^b$</td>
<td>0.54</td>
<td>0.005</td>
</tr>
<tr>
<td>Early lactation (spring 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk solids (kg/d)</td>
<td>2.42</td>
<td>2.43</td>
<td>2.39</td>
<td>0.01012</td>
<td>0.772</td>
</tr>
<tr>
<td>Milk protein (%)</td>
<td>3.75$^a$</td>
<td>3.67b</td>
<td>3.72ab</td>
<td>0.0602</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Milk fat (%)</td>
<td>5.48</td>
<td>5.32</td>
<td>5.38</td>
<td>0.2299</td>
<td>0.394</td>
</tr>
</tbody>
</table>

Notes:
Table 3: Mean urine N characteristics, volume and total N output of dairy cows grazing perennial ryegrass-white clover pasture, plantain or 50-50 pasture-plantain. LSD = least significant difference ($\alpha = 0.05$). Means followed by different letters denote that values are significantly different at the 5% level.

<table>
<thead>
<tr>
<th>Pasture</th>
<th>Pasture-plantain</th>
<th>Plantain</th>
<th>LSD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late lactation (autumn 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N concentration (g N/L)</td>
<td>5.4$^a$</td>
<td>3.6$^b$</td>
<td>2.4$^c$</td>
<td>0.06</td>
</tr>
<tr>
<td>Total volume/day (L/d)$^1$</td>
<td>46.5 (3)</td>
<td>59.1 (3)</td>
<td>73.8 (3)</td>
<td>23.65</td>
</tr>
<tr>
<td>Average volume/urination (L)$^2$</td>
<td>3.23 (95)</td>
<td>2.87 (88)</td>
<td>3.34 (86)</td>
<td>0.552</td>
</tr>
<tr>
<td>N output/d</td>
<td>251</td>
<td>213</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Early lactation (spring 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N concentration (g N/L)</td>
<td>4.7$^a$</td>
<td>3.4$^b$</td>
<td>2.2$^c$</td>
<td>0.046</td>
</tr>
<tr>
<td>Total volume/day (L/d)$^1$</td>
<td>43.6 (2)</td>
<td>33.6 (2)</td>
<td>54.1 (3)</td>
<td>33.31</td>
</tr>
<tr>
<td>Average volume/urination (L)$^2$</td>
<td>2.75 (67)</td>
<td>2.82 (51)</td>
<td>3.09 (66)</td>
<td>0.491</td>
</tr>
<tr>
<td>N output (g N/d)</td>
<td>205</td>
<td>114</td>
<td>119</td>
<td></td>
</tr>
</tbody>
</table>

Grazing management of diverse pastures to support milk yield

Grace Cun

Diverse pastures containing additional legumes and herbs have shown to reduce urinary N concentration of dairy cows (Bryant et al., 2017; Totty et al., 2013) and improve pasture production (Nobilly et al., 2013). However, compared with perennial ryegrass, the alternative species in diverse pastures have different grazing requirements which can affect regrowth, persistence and nutritive value. In this research, options to manage diverse pastures for improved pasture production and animal production were investigated using normal grazing (3.5 cm or 7-8 clicks on the plate meter) or lax grazing (5 cm or 10-11 clicks on the plate meter). A lax defoliation regime allows the parent grass tiller to reach anthesis prior to mowing or grazing, and has shown to aid daughter tiller survival and improved dry matter yield and persistence ("late control"; Matthew, 1991, Matthew et al., 1989). However, it is also recognised that leaving behind a high pasture residual in spring may reduce herbage quality and decrease milk yield. A lactation study was used to investigate whether a combination of lax grazing in one rotation followed by pre-graze mowing in the next rotation could improve both pasture production and milk yield of cows grazing diverse pastures (Table 4).

Results show a lax grazing management in spring, coupled with a longer rotation length (22 versus 27 days), increased pre-graze mass (>1000 kg DM/ha) and this contributed to a lower milk yield in November. Incorporating pre-graze mowing wasn’t enough to offset the milk yield reduction in November or during the following rotation in December (Table 5). In this study, lax
grazing didn’t improve herbage growth rates compared with normal grazing. Although mowing improved ME in December compared to lax grazing it wasn’t enough to improve milk yield.

These results further demonstrate the negative impact of high pre-graze herbage mass on milk yield. At high herbage mass, pre-graze mowing didn’t improve milk yield in the current rotation but can improve pasture quality in the subsequent rotation.

**Table 4:** An initial set-up phase (Sep-Oct) in the experimental area was grazed by dairy cows to create different pasture masses to allow the area to be grazed at the same time during the trial period in Nov. Then in Dec, an experiment was designed to determine the effects of pre-graze mowing in the subsequent grazing rotation. Grazing pasture heights shown are target heights.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>10-Sep</th>
<th>30-Sep</th>
<th>17-Oct</th>
<th>22-Oct</th>
<th>10-17 Nov</th>
<th>14-21 Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 3.5 cm</td>
<td>---</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 3.5 cm</td>
</tr>
<tr>
<td>Lax</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 5 cm</td>
<td>Graze to 5 cm</td>
<td>---</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 3.5 cm</td>
</tr>
<tr>
<td>Mow</td>
<td>Graze to 3.5 cm</td>
<td>Graze to 5 cm</td>
<td>Graze to 5 cm</td>
<td>---</td>
<td>Pre-mown to 3.5 cm</td>
<td>Graze to 3.5 cm</td>
</tr>
</tbody>
</table>

**Table 5:** Pasture regrowth from Nov-Dec, pre-grazing herbage mass, forage metabolisable energy (ME), total milksolids of Norm, Lax and Mow treatments. Values followed by different superscript statistically significant (P ≤ 0.05).

<table>
<thead>
<tr>
<th></th>
<th>Norm</th>
<th>Lax</th>
<th>Mow</th>
<th>Significant?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture regrowth (kg DM/ha/d)</td>
<td>40.8</td>
<td>38.5</td>
<td>36.8</td>
<td>No</td>
</tr>
<tr>
<td>Pre-graze yield (kg DM/ha)-November</td>
<td>3105a</td>
<td>4190b</td>
<td>4108b</td>
<td>Yes</td>
</tr>
<tr>
<td>Metabolisable energy (MJ ME/kg DM)</td>
<td>12.23</td>
<td>12.14</td>
<td>12.30</td>
<td>Slightly</td>
</tr>
<tr>
<td>Milksolids (kg MS/cow/d)</td>
<td>2.43</td>
<td>2.34</td>
<td>2.25</td>
<td>Slightly</td>
</tr>
<tr>
<td>Pre-graze yield (kg DM/ha)-December</td>
<td>3614</td>
<td>3582</td>
<td>3401</td>
<td>No</td>
</tr>
<tr>
<td>Metabolisable energy (MJ ME/kg DM)</td>
<td>11.4</td>
<td>11.3</td>
<td>11.7</td>
<td>No</td>
</tr>
<tr>
<td>Milksolids (kg MS/cow/d)</td>
<td>1.80</td>
<td>1.87</td>
<td>1.87</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes:
Key messages

• By optimizing forage growth and N uptake, N leaching loss can be reduced using:
  • Forages which are more winter-active e.g. Italian ryegrass
  • Forages which reduced urine-N excretion e.g. Italian-plantain-white clover mixture.
• Good irrigation management could reduce NO$_3$ leaching losses from spring deposited urine in grazed pastures.
• Applying N fertiliser rates above 180 kg N/ha/year increases the risk of higher N urinary outputs because of increased N intake.
• At similar N fertiliser rates, Italian ryegrass and plantain are higher yielding than perennial ryegrass.
• Plantain pastures can be used to reduce N loading at the urine patch while maintaining or improving milk production.
• Using lax grazing to manage diverse pastures in spring is unlikely to provide DM production and milk yield benefits.

Acknowledgements

This research was completed as part of the Forages for Reduced Nitrate Leaching programme with principal funding from the New Zealand Ministry of Business, Innovation and Employment and DairyNZ. The programme is a partnership between DairyNZ, AgResearch, Plant & Food Research, Lincoln University, Foundation for Arable Research and Landcare Research.

References


Matthew, C 1991. "Late Control"-what is it and why should it work?, Massey University, Palmerston, New Zealand.


Notes:
Introduction

The dairy industry in New Zealand has a range of structures that provide individuals with the opportunity to both work and invest in the sector to grow their wealth. Structures such as 50% Sharemilking have been a key feature of the industry for the last century while other structures such as joint ventures (equity partnerships) are a more recent development.

The level of investment by sharemilkers and shareholders in equity partnerships in dairy farming businesses is higher than ever, typically now often more than $1.0M. Most dairy farming businesses no longer fit into the “small business” category. Not only is hard earned equity being risked but often investments in sharemilking and equity partnerships involves significant borrowing, which brings additional challenges.

Businesses generally are now subject to many more rules and regulations than was the case in the past and compliance with the rules is a significant risk to those in senior management or governance roles e.g. environmental compliance, workplace health and safety. The implications of failing to comply with regulations could see a sharemilker or shareholder director of a company fined or even jailed.

Given these factors it would be logical to assume that sharemilkers and equity investors would be undertaking detailed and comprehensive due diligence processes before entering into sharemilking agreements or equity partnerships.

Unfortunately my experience is that in many cases the level of scrutiny doesn’t match the risks involved. During my time as a consultant I have been involved in a number of disputes between equity partners and sharemilkers and farm owners where the issues at the core of the dispute were evident at the outset of the relationship but were not uncovered, or if they were the issues were not dealt with at the time.

Notes:
The cost of getting it wrong today is significantly greater than it was in the past. There is a level of complacency in relation to sharemilking agreements (including contract milking agreements), where the respective parties believe the risks are less because the relationship is covered by a standard sharemilking agreement. Nothing could be further from the truth. Every sharemilking position is unique and should be treated as such.

Often the sharemilking or investment opportunity is within a family farming business. Here too there is often too much complacency around the due diligence processes and a lack of formal agreements. This is ironic as the worst disputes I have been involved in over the years have been where the respective Parties have been related.

So what does a sharemilker or potential equity investor have to do to assess the risk (and opportunity) in a particular venture – what does good due diligence look like?

Due diligence processes

The term “due diligence” sounds daunting but in simple terms I would define it as: -

“A systematic investigation into the people, processes and assets that comprise a business, which provides the necessary information for a potential investor to evaluate the costs, benefits and risks to enable an informed decision on whether to invest in the business.”

In addressing due diligence for a dairy farming investment (including all forms of sharemilking) I am going to concentrate on the risks that will be specific to a particular farm property.

It is worth noting that right now the biggest risk to investors in the dairy industry is probably milk price volatility. Interest rate risk isn’t far behind. Neither of these risks can be controlled but there are tools to enable the risk to be managed. A particular investment needs to be considered in the context of these major risk factors.

I broadly define four main areas of focus for a systematic investigation:

1. People
2. Processes
3. Infrastructure
4. Biological assets.

People

I have put this at the top of the list because it is the most important aspect of any business relationship. In the dairy industry there has tended to be a focus on the hard assets of the business – land, cows, water etc. These are important but if the people that comprise the investment don’t get along then the investment is unlikely to succeed.
So the due diligence process needs to focus on the people – the owner or employer of the sharemilker and the shareholder and directors of the investment entity.

A sharemilker will often go through a thorough recruitment process before being offered a job, which will often involve having to supply referees details or references. The sharemilker can go through the same process – maybe requesting the employer to provide referees (if they haven’t already offered); ask to speak to existing and past sharemilkers and/or employees. This is a relatively simple process for an individual owner/operator employing a sharemilker but can be more difficult where the employer is a corporate. In this situation it is important to know who will supervise the operation of the farm.

The sharemilker/equity partner should create an opportunity to “interview” the prospective employer. This might take the form of a discussion where the sharemilker gets to directly question the employer about aspects of how they work with people and manage relationships.

This is doubly important for a prospective equity partner, who might not only be a shareholder but also a company director and may also work for the business. Good governance is fundamental to the success of a company and good governance is in part being able to work constructively with people who have differing views. If there is not honesty, respect, tolerance and a level of trust around the board table good governance will be compromised.

**Processes**

This is how the business is run. This is highly dependent on the people involved in the business and relates to how well the business is structured and operated.

Processes can be assessed by analysing the documentation involved in operating the business.

In the sharemilking situation this might include:

- The sharemilking agreement and the process by which the sharemilking agreement was completed:
  - The split of costs and cost sharing arrangements
  - Livestock number allowances

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Notes:
Any limits on milksolids production
Share of revenue.

Structured communications:
Reporting
Regular meetings
Annual review of performance.

Compliance documentation:
TB status
Effluent compliance reports
Effluent management plan
Irrigation water use compliance reports
Farm environment plan
FEP audit reports
Nutrient budgets
Dairy company audit report.
Workplace health & safety audit reports.

Performance reports:
Historical milksolids production
Historical milk quality data
Herd MINDA profile
Soil test reports
Fertiliser history
Pasture production
Re-grassing plans
Historical feed inputs.

It is important to understand how the farm is being operated now and if any changes are anticipated. What is the farm system being operated? Will feed and nutrient inputs continue at current levels? Are any major farm improvements planned? Will the sharemilker be provided with a copy of the operational budget for the farm?

The potential equity investor should try and access the same information as the sharemilker but the information requirements for equity investment are considerably greater. An equity partnership that has operated for some time should be able to provide the potential investor with a raft of detailed information, including:

Company constitution
Shareholders Agreement
Strategic Business Plan
- Company minute book
- Annual financial accounts and budgets
- Company policy manuals
- Access to the Company’s professional advisers.

Where an equity partnership is being established, many of these documents will have to be prepared and negotiated between the shareholders.

A key document for an equity partnership is the shareholder agreement. This agreement should detail how the shareholders intend to manage the business and should cover such issues as:

- Partners’ goals and aspirations
- Allowable levels of shareholding by Shareholders
- Partners’ guarantees
- The role of Shareholders in the running of the Company, the day to day business and their remuneration
- Professional input - banking, legal, accounting, business consultant – ideally these should be independent of Shareholders
- Details of the business (farming) policy
- Shareholder loans – how these are managed
- Dividend policy
- Debt levels and targets
- Future equity contributions from Shareholders
- Arbitration and "divorce" clauses - what happens if the Shareholders cannot agree?
- Reporting and decision making processes
- "Sunset" clause.

In the event that key items on these information lists are not provided this should immediately raise concerns about the quality of the processes of the business and/or the motives of the people operating the business.

Notes:
**Infrastructure**

This involves an assessment of the farm infrastructure and its suitability for the farm system being operated and generally this evaluation is done to a good standard.

Obvious key infrastructure items of infrastructure are:

- Staff accommodation
- Milking shed and effluent system
- Cow lanes
- Irrigation systems and water supply
- Stock/shed water supply
- Calf/implement sheds
- Fencing
- Stand-off pads
- Farm machinery – if provided for a sharemilker

Given the current focus on environmental management and compliance, aspects of the fencing and bridging or waterways are important considerations. The quality of the effluent and irrigation systems to be able to operate within consent conditions now has more of a focus, as have the sheds and standoff areas to manage the welfare of livestock.

There is no such thing as the perfect farm and I find there are always “trade-offs’ to consider. For example the milking shed and yard might be a bit stretched by the cow numbers but the accommodation is of good quality and the farm is close to town, so that recruiting and retaining the labour needed to operate the farm should not be a high risk.

**Biological assets**

The animals and the pastures that form the basis of a good dairy farm. The evaluation of these aspects of a business is usually well done.

**The evaluation process**

Once the information has been gathered the next step is to evaluate the information to inform a decision by the sharemilker or investor as to whether to proceed or not. Not everyone will be confident to do this themselves and I would recommend that professional advice is sought to make the evaluation.

Seeking professional advice from an accountant, lawyer or consultant is often viewed as expensive and unnecessary. In my view it is often the best investment a sharemilker or investor can make. The professional advisor will identify risks that might not initially be obvious and they can act as a sounding board for trying to alleviate the risk.
In the context of an investment worth hundreds of thousands of dollars or more, expenditure of $10-20,000 on professional advice is not expensive and may lead to significant savings further in to a contract.

**Evaluation tools**

When assessing a potential investment it is useful to take a quantitative approach rather than make a qualitative judgement. There are some simple “tools” that can assist a quantitative assessment. Two of these are:

5. Risk Ranking
6. Financial Budget Model.

**Risk Ranking**

This is a relatively simple process of developing some key criteria for the sharemilking position or equity investment under the headings detailed above. Each criterion is given a weighting and a simple 1-5 ranking criteria (1 being very low risk, 5 being very high risk) is applied to each criteria. The ranking is then multiplied by the weighting and the weighted rankings are totalled to give an overall ranking for the proposition. The lower the total the lower the risk.

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Notes:
If in the position to evaluate more, the risk assessment can provide a formal guide as to which option stacks up best against the set criteria.

Financial budget modelling

At some point in the process a budget for the investment will be required. I find it useful to start budget modelling early in the process and as information becomes available update the model with the new information. I find basic spreadsheet models are ideal for this analysis.

The model should reflect the risks associated with the investment. Taking the milking shed example from above – the fact that it will be a bit stretched might mean that the sharemilking business will need an extra labour unit – this would be reflected in the cost structure and possibly impact the bottom line.

The budget model can be prepared to provide some key metrics for the business. The focus may be on cost of production or cost of production per kilogram of milksolids. It may be on net cash trading profit or cash surplus.

Ranking these metrics against a target or again comparing options can provide a clear evaluation of the options.

The budget model is also a useful tool to do a sensitivity analysis.

- A “status quo” option where the business achieves potential production at a long term milk price and interest rate, and a certain cost of production.

<table>
<thead>
<tr>
<th>Risk Ranking</th>
<th>Weighting</th>
<th>Ranking</th>
<th>Weighted Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>People - 30% weighting</td>
<td>30%</td>
<td>3</td>
<td>0.90</td>
</tr>
<tr>
<td>Processes - 25% weighting</td>
<td>Information Availability</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Information quality</td>
<td>5%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Farm system</td>
<td>5%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sharemilking Agreement</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td>Infrastructure - 26% weighting</td>
<td>Irrigation</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Milking shed/Effluent</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Staff accommodation</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Biological - 20% weighting</td>
<td>Livestock</td>
<td>10%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Pastures</td>
<td>10%</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>2</td>
<td>2.40</td>
</tr>
</tbody>
</table>
• Alternatively, a “worst case” scenario might be run where low production and milk price and high costs are used.

Running these scenarios will define in financial terms the range of risk for a particular investment.

Summary

The relatively high level of investment required in dairy farm businesses today and the rule and regulations that govern how dairy farms are operated create significant risk for those involved.

Sharemilkers and equity investors contemplating investment in the dairy sector can mitigate these risks by undertaking a robust due diligence process before committing to an investment.

Good due diligence processes involve the collection of large amount of information about the people, processes and assets of the business and then analysing this data to provide the information to make an informed decision on whether to proceed.

Farm infrastructure and biological assets are usually assessed to a good standard by dairy farm investors. Stronger due diligence is required of the people and the processes by which the investment will be operated.

Quantitative assessment tools such as risk ranking and financial budget modelling are useful tools to take the emotion out of the investment.
SIDDC harnesses the complimentary capabilities of Lincoln University, DairyNZ, Ravensdown, LIC, Plant & Food Research, AgResearch and SIDE to enhance profitable, sustainable dairy farming in the South Island.

SIDDC’s work and focus includes:

- **Managing** the Lincoln University Dairy Farm (LUDF) on behalf of the University as a commercial demonstration farm, focussing on maintaining a highly profitable farm while operating with low nutrient losses.

- **Providing** weekly and seasonal management notes, financial information, and production results for LUDF. See [www.siddc.org.nz](http://www.siddc.org.nz) and at facebook/LUDF.

- **Supporting** the Southern Dairy Development Trust (SDDT), and the *Southern Dairy Hub*; - a three way partnership between AgResearch, DairyNZ and Southern Farmers (through SDDT) to provide a large scale research and demonstration farm of approximately 800 cows on 350 ha, near Invercargill.

- **Engaging** with the wider community to showcase responsible and profitable dairying.
Sick of collecting farm data that has no use? Want to know the minimum amount of information you need to collect? This workshop will demonstrate what data needs to be collected on farm to give you the right information to enable effective and profitable decision making. It will highlight the best practices used on profitable farms as identified by DairyNZ, how data is utilised by FARMAX Dairy to provide insights into your Farm system, and how to achieve sustainable profitability.

DairyNZ have clearly identified practices carried out by the most profitable Farm businesses. The top 4 are: Benchmarking; Budgeting; Confident Decision Making; and Networking. If those are the skills identified to operate a successful farm business, how do owners and managers piece them all together to achieve their objectives? What information is required and what technology systems exist to make sense of it?

Farmax has provided world leading decision support tools for pastoral farms in New Zealand for 15 years. It is an evidence based tool originally developed by AgResearch and used widely by Government, industry support organisations, regional councils, rural consultants, educational institutes and Farm business owners.

The Farm information for better results workshop shows what essential data needs to be collected on-farm and how it is utilised by the FARMAX system to cover best practice on Farm.

1. **Budgeting** – using the FARMAX system, how a biologically validated plan of the farm business for the Season(s) ahead can be created and used to compare different options.

2. **Benchmarking** - how data feed into the FARMAX system can provide benchmarking comparisons not only within the Farm business (across seasons), but also against similar farms, or against industry averages.

Notes:
3. **Confident decision making** – Farming is a simple business model – the conversion of one form of energy (feed) into another (milk solids). However, the farm system is complex – to operate a profitable, sustainable business there are an increasing number of variables to be considered and managed. Gut feeling and intuition, while being a quintessential part of the NZ farming story, is no longer a reliable method of decision making for farm businesses. The FARMAX system, through its scientifically validated biological model, enables farmers to look into the future. It enables physical and financial feasibility of different scenarios to be investigated before action is taken. The result is proactive and confident decision making.

4. **Networking** – Successful farm businesses rely on a network of skilled operators helping with, and supporting, on-farm decisions. It is vital everyone involved has timely and accurate information regarding the farm system and its performance. The FARMAX Cloud enables that to occur.
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