Implementation of the Fonterra Palm Kernel Guideline

Image Source: New Zealand Farm Source website

Kellogg Rural Leadership Programme
Research Project

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1 Executive Summary

The use of Palm Kernel (PK) as a supplementary feed for NZ dairy cows has seen unprecedented growth over the past decade, despite volatile milk prices. Demand has been driven by system intensification, a production focus and climatic challenge. The availability, flexibility and cost-competitiveness of PK make it a popular choice with dairy farmers.

New Zealand imports around a third of total palm kernel produced and is the largest sole importer. Palm kernel is a by-product of the palm oil industry, which is considered to have an adverse global environmental footprint associated with deforestation, biodiversity loss and greenhouse gas emissions, particularly in Indonesia and Malaysia.

In response to an increasing amount of PK fed to dairy cows by its suppliers, Fonterra Co-operative Group (Fonterra) announced the introduction of a PK guideline in September 2015, recommending a maximum feeding level of 3 kg/cow/day to future-proof the co-operative as a supplier of pasture-based milk. Further communication indicated a milk test was being developed to assess PK feeding levels. There was a likelihood that high PK feeding levels were causing milk composition changes that could cause issues with manufacturing and/or customer specification requirements.

The aim of this project was to understand individual farmer use of PK, their understanding of the Fonterra PK Guideline, the changes and time-frame required for implementation and the perceived impact. Their views on the likelihood of a future nil PK directive and an associated transition time were also explored.

Ten Fonterra farmers were interviewed who were feeding above the PK guideline level for all, or a part of, the season. In addition, industry professionals (industry body and farm consultants) were also interviewed to give a broader perspective to how implementation could be achieved and what the impact would be.

All farmers rated PK as important or very important to their farming business, despite using it in different ways and for different reasons. Findings indicate farmers use PK as a base feed to underpin stocking rate or predictable climatic challenge, a buffer for vagaries of pasture growth or as an emergency response to an adverse climatic event, or a combination of these uses.

Interviews found implementation of the guideline is achievable. For most farmers it is anticipated change will be incremental rather than transformational. Options to reduce the level of PK fed to guideline levels included:

- Reducing feed demand through stocking rate, culling and drying off decisions,
- Reducing feed supply by non-replacement of PK above guideline levels
- Increasing feed supply from home-grown feeds or alternative imported feeds

The impact of the guideline on farmers will depend on the degree of change required to adhere to the guideline and the climatic challenges they face. The impact could be minimal or even negated if other aspects of the farm feed system are optimised.

There is a need for farming systems to increase their resilience to climatic challenge and adverse events. Although System 4 & 5 farmers (high input) would be most immediately affected by the guideline, it was anticipated System 1 to 4 farmers (nil, low and medium input) would be made most

vulnerable, particularly in challenging or adverse climatic events. It is recommended Fonterra communicate a PK policy for adverse climatic events as this was considered to be the most likely challenge to compliant feeding thresholds.

Farmers indicated a twelve month period would be required for transition. It is recommended Fonterra adopt this time-frame for compliance and provide milk test results during this period. It is anticipated there will be variation in feeding levels for compliance both between farms and within individual farms, due to seasonality and management differences. Farmers should be encouraged to challenge the milk test during transition to find their individual farm feeding thresholds.

A consistent message from interviews was the need for Fonterra to provide more clarity and proof around what they were asking farmers to do. Farmers were unclear whether the motivation for the guideline was milk composition creating processing issues or customer expectations around sustainability or product specification, or a combination of both. It is recommended that Fonterra provides relevant research around the key drivers of the guideline and clarity around factors that will influence farmer management.

Seven out of ten farmers and four out of six industry professionals felt Fonterra was unlikely or highly unlikely to introduce a nil PK directive in future. Reasons given were that adherence to the guideline would overcome milk processing issues, a perceived lack of consumer willingness or ability to pay a premium for a PK-free product and the risk of supply loss to competitors for Fonterra. Those that believed a future nil PK directive was likely, thought so because of issues with customer perception and sustainability. Farmers felt that if a nil PK directive was made, they would require 2-3 seasons to transition.

Although beyond the scope of this project, interview findings have also led to broader recommendations for Fonterra to develop a “Know Your Customer” programme, develop a NZ grass-fed certification standard and investigate a ‘grass-only, home-grown’ specialty milk pool.

2 Acknowledgements

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I would like to personally thank each of the farmers and industry professionals involved for giving me their time and valuable insight. It never ceases to impress me how adaptable and forward-thinking New Zealand dairy farmers are and how readily they share information for the common good.

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4 Project Purpose

This project aims to understand how farmers will approach implementation of the Fonterra Palm Kernel Guideline, specifically those farmers who are feeding over the recommended feeding level. It will explore farmer understanding of the rationale for the guideline, individual farmer use of PK, the changes they would make to implement the guideline, the time for transition to guideline levels and the anticipated impact of implementation. Response to a hypothetical nil PK directive will also be explored.

5 Introduction

In response to an increasing amount of palm kernel (PK) fed to dairy cows by its suppliers, Fonterra Co-operative Group released an email to suppliers (Appendix I) and a statement to media (Appendix II) on 21st September 2015 announcing a PK feeding guideline of a maximum of 3 kg/cow/day.

"Fonterra Co-operative Group Limited is taking steps to future proof the Co-operative's position as a world-leading and trusted producer of pasture-based milk products and to stay ahead of global consumer expectations.

This commitment has seen Fonterra today advise its farmers that it is establishing guidelines for the use of Palm Kernel Expeller (PKE) as a supplementary feed for dairy cows. Going forward the Co-operative is recommending PKE guidelines to its farmers of a maximum of 3kg/per cow/per day.

After pasture, PKE is one of the cheapest supplementary feed options for farmers, and our data shows that use of PKE is increasing. We recommend our farmers follow these guidelines in order to future-proof the Co-operative's position, while upholding our high standards of animal welfare.

The recommended maximum of 3kg/per day/per cow is a voluntary guideline and we will be working with our farmers to help them maximise on-farm profitability while ensuring the health of their herd."

Fonterra Co-operative Group Media Release, 2015

Fonterra subsequently released further information unofficially to suppliers through shed meetings. This information indicated PK could affect the composition of milk with a negative impact on processing and customer requirements.

"We have seen a significant increase in the use of PKE over the last few years.

If this continues it could affect the composition of milk to the point where we can't process it to meet customers' requirements."

Fonterra Co-operative Group, 2015

Fonterra indicated a milk test was being developed for tracking high PK use and anticipated that it would be ready in 2016.

6 Literature Review

6.1 Palm kernel

Palm kernel is a by-product of the palm oil industry. Palm oil is found in a wide range of consumer products, ranging from processed food to cosmetics to cleaning products to bio-fuels. The oil is harvested from the fruit of the oil palm tree (*Elaeis guineensis*), a native of West Africa which was introduced into Malaysia and Indonesia over 100 years ago. Indonesia is now the world's largest producer of palm oil (Greenpeace, 2015).

The oil palm gives the highest yield of oil per unit area compared to any other crop and produces two distinct oils – palm oil and palm kernel oil – both of which are important in world trade (FAO, 2002).

The palm fruit has an outer skin (the exocarp or pericarp), a fibrous pulp (mesocarp) and a central nut consisting of a shell (endocarp) and the kernel. The pulp and kernel are mechanically pressed to extract the oil. The term "expeller" refers to this process (Federated Farmers, 2011) and PK is often referred to as PKE (Palm Kernel Expeller). The kernels are ground into small particles, heated and the oil extracted using a screw press. The kernels are then dried to a moisture content of around seven percent. PK destined for animal feed is stored in large warehouses prior to shipping.

Palm kernel can also be solvent extracted (SPKM) using petroleum-derived solvents. Most of the PK imported into New Zealand is mechanically extracted.

Revenue from palm kernel is estimated to be less than 5% of gross revenue from the palm oil industry. In 2009, Malaysian revenue from PK was 1.0% of total revenue generated by the palm oil industry (Federated Farmers, 2011).

6.2 Fonterra Co-operative Group

Fonterra Co-operative Group (Fonterra) was formed in 2001 following a government-sanctioned mega-merger of New Zealand's two largest dairy co-operatives, New Zealand Dairy Group and Kiwi Co-operative Dairies, with the New Zealand Dairy Board. It is New Zealand's largest dairy company with approximately 10,500 NZ suppliers who own shares in the company relative to their 3-year rolling average milk production (kg milksolids). Fonterra collects approximately 84% of the national milk supply.

Fonterra is the largest exporter of dairy in the world market, producing more than two million tonnes of dairy ingredients and consumer products for 140 markets. In addition to its NZ business, Fonterra runs integrated businesses in other countries with milk supply pools in Australia, South America, Sri Lanka and China.

Through its supply subsidiary RD1 Limited (trading as Farm Source), is a significant importer of PK into NZ. In 2015, Fonterra stated it imported approximately 550,000 tonnes of PK into NZ (Fonterra Co-operative Group, 2015). Fonterra purchases all its PK from International Nutritionals Ltd (INL) which imports it from Wilmar International.

6.3 New Zealand PK import data

New Zealand is the largest single importer of palm kernel in the world (Index Mundi, (a)), accounting for around one third of all imports (Foote, 2014). This demand reflects New Zealand's relative proximity to the source, lack of large-scale supporting feed industries (c.f. USA and Australia), dairy farm system intensification and its cost-competitive price on-farm.

Palm kernel imported into New Zealand comes from Indonesia and Malaysia. Palm kernel was first imported into New Zealand in 1992. Import levels have increased substantially from 318,000 tonnes in 2000 to a peak of 2.4 million tonnes in 2015 (Figure 1).

Figure 1. **Source: Index Mundi website (b)**

Demand for PK escalates when regional climatic conditions are challenging, adverse events occur such as drought, flood or snow, and/or when milksolids payout signals are positive.

However, the amount of total PK imports has continued to rise despite the volatility of milksolids payout to farmers. The peak total of 2.4 million tonnes imported in 2015 was despite the milksolids payout being the lowest for nine years (Mounsey, 2015).

Fonterra data indicates palm kernel now represents more than 40% of total supplementary feed fed to dairy cows and more than 5% of all feed consumed by NZ dairy cows (Maclean, B., pers. comm., 28 April 2016).

6.4 New Zealand palm kernel pricing

As with any wholesale feed, the price of PK responds to the market forces of supply and demand. The price of PK per tonne or kilogram ($/t DM or c/kg DM) and per megajoule of metabolisable energy (c/MJME) are frequently considered by farmers relative to comparable supplements such as grains (Figure 2) or silage.

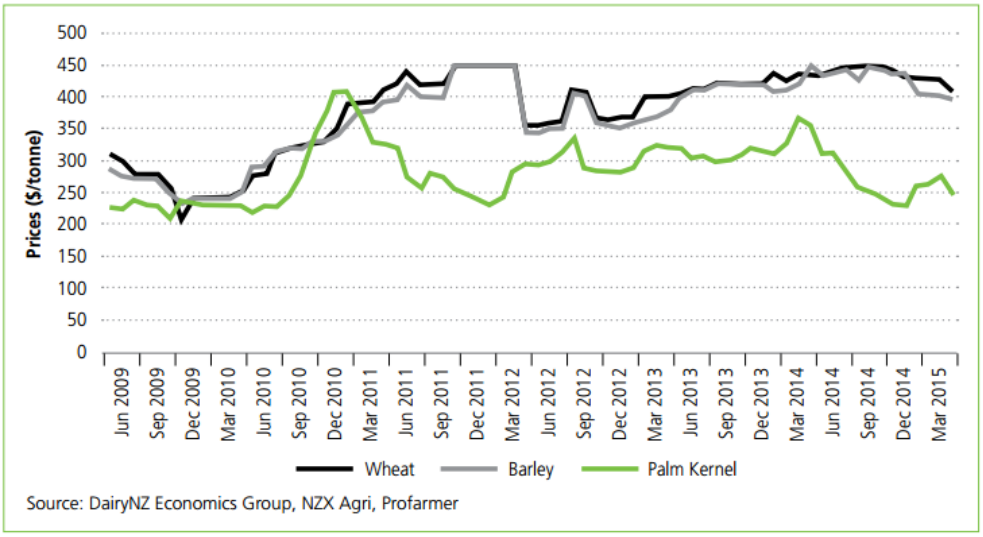

Figure 2: Feed prices (DairyNZ Economic Survey 2014-2015)

The DairyNZ Economic Survey (2016a) showed PK prices declined in 2014-15 by 17.1% to an average of $266 per tonne. The final average cash payout of $5.76/kgMS (including dividend) was below the decade average and 25% lower than the average milk payout received the previous season, despite an opening forecast milk price of $7.00/kgMS (excluding dividend).

This highlights the challenge for farmers, who are forced to make judgements around the profitability of feeding supplements such as PK with the vagaries of climate and uncertainty of the final milk price. Palm kernel prices are typically highly correlated to the forecast milk price, as this is the optimum assessment of the market at that time, but the volatility of dairy markets means the difference between forecast and actual payout can vary greatly (Mounsey, 2015).

To protect themselves somewhat from the risk of exposure, many farmers will forward contract all, or a certain proportion of, their PK requirements when they believe the price offered has a margin for profit.

6.5 Feed value to dairy cows

The feed value in PK comes from the ruminal digestion of fibre and protein, digestion of protein and fat in the small intestine and absorption of minerals (DairyNZ, web page).

6.5.1 Dry matter (DM)

PK is a very dry supplement (85-90% DM) with little moisture content.

6.5.2 Digestibility

Approximately 50% to 60% of PK is digestible in the rumen of the cow (DairyNZ, website). This is lower than the digestibility of pasture silage and maize silage, at 65-75% and 60-70% respectively (Hill

Laboratories). This digestibility factor is taken into account in the energy value calculation of PK (DairyNZ, 2015b).

6.5.3 Fibre

PK is high in fibre (70% Neutral Detergent Fibre, NDF) but does not contain any effective fibre (the fibre that stimulates rumination and saliva production) so, from a health perspective, it is recommended it should not make up more than approximately 60% of the diet (DairyNZ, 2015b).

6.5.4 Fat

PK has a relatively high fat content (8-10% DM) and an unusual fatty acid composition, being high in short and medium chain fatty acids. Most of its fatty acids are saturated and therefore don't appear to negatively affect fibre digestion. (DairyNZ, 2015b).

Although the fat content of solvent extracted PK is much lower than mechanically extracted PK, there doesn't appear to be a large difference in milksolids response to these two products. It is hypothesised that the chemicals used during solvent extraction may improve the digestibility of the fibre (DairyNZ, 2015b).

6.5.5 Protein

PK contains moderate levels of crude protein, approximately 14-18%. Approximately 55% to 60% of the protein is digested in the rumen with 40%-45% digested in the small intestine (DairyNZ, 2015b). It is low in the amino acid lysine so, in theory, could potentially limit milk production if it comprised more than 50% of the diet (DairyNZ, 2015b).

When investigating the effect of PK on the degradation of pasture in the rumen, Dias (2010) found that PK slowed the high degradation rate of crude protein in the rumen. He concluded that PK could have the beneficial effect of reducing the total rumen degradability of protein in the diet, thus resulting in better crude protein utilisation of pasture.

6.5.6 Starch

PK has very little starch so poses no risk of acidosis. It is therefore safe to feed in high quantities and doesn't require an introductory (rumen adaption) period.

6.5.7 Energy

As PK is a by-product feed, the quality can theoretically vary. However Dias (2010), found very little variation between samples. Issues exist with accurately calculating the metabolisable energy (ME) of PK due to lack of an equation which accounts for its fatty acid composition. Standard laboratory analyses indicate that PK has an ME of around 11.5MJ/kg DM because of its relatively high fat content, its reasonably digestible fibre, and its protein content (DairyNZ website). However a New Zealand feeding trial with lambs conducted by Dias (2010) calculated the ME of PK as much lower, at 9.8 to 10.3 MJME/kgDM.

6.5.8 Minerals

PK has reasonably high levels of copper and phosphorus. Although the amount of copper does not meet daily copper requirements, it is important cattle fed PK are not supplemented with additional copper unless on veterinary advice. It is recommended that the diet of cows prone to milkfever (hypocalcaemia) is limited to 3 kg/cow/day PK due to its high phosphorus content potentially interfering with calcium metabolism.

6.6 Animal performance & welfare

Energy is the most limiting nutrient for milk production in pasture based systems (Kolver & Muller, 1998), therefore farmers are looking at cheaper energy supplements to increase production and animal performance, without losing productivity (Dias, 2010).

6.6.1 Contribution to industry milk production

It has been estimated that palm kernel is responsible for up to 7-8% of New Zealand's milk supply (Dairy Exporter, 2015). However an independent dairy consultant has calculated it could be as high as 10% (McKay, B., pers. comm., 25 May 2016).

6.6.2 Effect on milk production and composition

Dias (2010) conducted a comprehensive study of the nutritional composition of PK and its effect on milk production when fed to lactating NZ dairy cows grazing pasture. He calculated the marginal response from feeding 1 kg PK was an extra 42 g and 53 g of milksolids when offered 3 kg or 6 kg of PK respectively.

His research found milk fat concentration increased by 5-10% when cows were fed PK with restricted pasture, but milk protein concentration was not significantly altered. The milk fatty acid profile of PK supplemented cows in Dias' study showed a higher percentage of short and medium chain fatty acids, lower concentrations of long chain fatty acids and an increased concentration of saturated fats.

Although milk production responses to PK fed in late lactation were moderate, Dias concluded that PK could be used effectively to extend lactation. This is supported by the Economic Survey for the 2013-2014 season which indicated 32% of the total PK was imported in the autumn as farmers fed more supplementary feed, including PK, to extend lactation in response to high milk price signals (DairyNZ 2015a).

A DairyNZ (2016b) late lactation trial looking at condition score gain comparisons between PK and maize grain found despite condition score gain being the same for both feeds, cows fed PK produced a higher concentration of both milk protein and milk fat. This was an unexpected outcome and led the researchers to propose whether PK created less substitution than maize grain or that current laboratory predictions of ME of PK are incorrect.

6.6.3 Effect on body condition score gain

Body condition score (BCS) targets at key stages of lactation have been identified to optimise dairy production systems (DairyNZ, 2012).

Palm kernel has been fed by dairy farmers to target condition score gain in mid-late lactation and in dry cows. Research results suggest that PK, with its higher fat content, may be used more efficiently than starch (e.g. maize silage) for BCS gain in dry pregnant cows (Mandok, 2014).

Based on experimental results, DairyNZ (2012), estimated it would cost $45 to $70 (PK average $270/tonne) for a 1.0 unit BCS gain if using PK or maize silage efficiently. At a $6.00/kg MS milk price, this was calculated to return $70 to $90 in milksolids and $40 in reproductive benefits.

6.6.4 Animal welfare

Animal welfare is concerned with the state of individual animals, not the herd as a whole (MPI, 2014). However in the New Zealand dairy industry, the welfare of a whole herd can be threatened under adverse climatic events. The agreed Code of Welfare for Dairy Cattle (MPI, 2014) stipulates that if individual cows are less than BCS 3.0, they must be managed to increase their BCS. It also states that farmers prone to drought "have a plan in place that ensures stock feed requirements can be met before stock welfare is compromised".

Palm kernel has played a significant role in preventing or addressing concerns around animal welfare by increasing individual cow body condition score (feeding sick or poorly conditioned cows) or maintaining cow and young stock intakes under adverse conditions (for example in drought or flood situations).

6.7 Environmental effects of palm oil industry

The expansion of the palm oil industry has attracted global attention due to its detrimental environmental effects and unsustainable practices.

6.7.1 Deforestation

Expansion of the palm oil and pulp and paper industries has seen deforestation of tropical rainforest on a massive scale in South East Asia. Over the past twenty-five years, Indonesia's palm oil production has increased nearly six-fold. Only half of its peatlands remain forested with 31 million hectares of rainforest destroyed since 1993 (Greenpeace, 2015).

6.7.2 Biodiversity loss

Conversion of tropical rainforest to monoculture palm plantations results in significant biodiversity loss. Deforestation has caused a significant loss of habitat, most notably for orangutans and the Sumatran tiger (Foote, 2014).

6.7.3 Greenhouse gas emissions

Forest fires associated with deforestation can be significant contributors of greenhouse gas (GHG) emissions. Daily GHG emissions from forest fires in Indonesia in September and October 2015 regularly surpassed the daily GHG emissions of the United States (Greenpeace, 2015).

The palm kernel shell and fibrous pulp are commonly used as a source of fuel for the large boilers used to generate superheated steam for electrical power generation in large-scale plants, contributing to GHG emissions (FAO, 2002).

6.7.4 Sustainability in palm oil industry

Developing countries with a growing palm oil industry, such as Indonesia, outline the benefits of a sustainable industry, including a pathway out of poverty (World Growth, 2011). In the World Growth report, this opportunity was referred to: "It is crucial that developing nations be given the same opportunities which developed nations have benefited from."

However, there is growing global demand for the palm oil industry to implement sustainable practices more quickly driven by consumer demand to stop deforestation and biodiversity loss. The Roundtable on Sustainable Palm Oil (RSPO), The Forest Trust (TFT) and Greenpeace are organisations with a focus on sustainability in the palm oil industry.

6.7.4.1 Roundtable on Sustainable Palm Oil (RSPO)

The RSPO (Roundtable on Sustainable Palm Oil) is a non-profit organisation set up by the WWF (World Wildlife Fund) to promote the growth and use of sustainable palm oil products through credible global standards and engagement with stakeholders. Fonterra has been a member of the RSPO since 2009 (Fonterra, 2015).

The RSPO has come under increased scrutiny and criticism from other organisations, including The Forest Trust (2013) and Greenpeace (2015), concerned with its inability to stop deforestation.

6.7.4.2 The Forest Trust

The Forest Trust (TFT), formerly the Tropical Forest Trust, is a global environmental charity helping companies run responsible supply chains. The TFT approach is around company responsibility and suggests that "companies should take full ownership of their sustainability performance, rather than externalising their responsible sourcing commitments to commodity roundtables." (TFT, 2013).

Nestlé was the first multi-national to announce a 'No Deforestation' policy in 2010 after consultation with TFT and many more have followed suit, including Wilmar International, which trades 45% of the world's palm oil. (TFT, 2015).

6.7.4.3 Greenpeace

Greenpeace is publicly opposed to the use of PK in New Zealand, based on issues of sustainability and detrimental environmental effects (Greenpeace, 2010). In 2009, Greenpeace environmental lobbyists

directly targeted Fonterra and picketed a ship from Indonesia delivering palm kernel. More recently in December 2015, Greenpeace NZ Executive Director Russell Norman met with Fonterra CEO Theo Spierings to discuss the deforestation in Indonesian from forest fires associated with the palm oil industry.

> "They're [Fonterra] going to have to stop buying cattle feed linked to forest destruction and peatland drainage."
>
> Russell Norman, Greenpeace NZ

6.8 Sustainability initiatives in the New Zealand dairy industry

6.8.1 Strategy for sustainable dairy farming

"Making dairy farming work for everyone" is the 2013-2020 Strategy for Sustainable Dairy Farming in New Zealand (DairyNZ, 2013). The strategy highlights the need for environmentally sustainable farming practices and acknowledges this has gained momentum, as well as the emergence of other factors, such as animal welfare.

> *"New Zealand's dependence on international markets means it is vital to maintain internationally credible product integrity criteria. 'Integrity' currently focuses on food safety but has scope to be expanded with other criteria such as the method of production and meeting animal welfare standards. This is inevitably concerned with meeting the expectations of international customers (and) their interest in the food safety, environmental and animal welfare provenance of their food products."*
>
> *"Vigilance also requires the dairy industry to identify, assess and respond to significant consumer preferences relating to on-farm practices. The structures and processes for product integrity must remain flexible and responsive to these demands."*

6.8.2 Certifiable standards

Some New Zealand dairy companies have implemented supplier agreements aligned with achieving sustainable dairying. Examples include Fonterra's "Supply Fonterra" and Synlait's "Lead with Pride" initiatives, both of which are internationally accredited dairy farm assurance systems (DairyNZ, 2013).

6.8.3 Feed use traceability

As part of Fonterra's risk management programme, farmers are required to keep records of feed supplements fed to their milking cows. This is viewed by an on-farm assessor during their annual Farm Dairy Assessment, which is a requirement of supply.

6.8.4 Dairy company positions on PK use

Other dairy companies operating in NZ have their own position on the use of PK.

- Danone, which manufactures infant formula under the Danone Nutricia brand at its Clydevale factory, has ruled out palm kernel as a supplementary feed option for its supplying farms (Trebilcock, 2016).

- Tatua Co-operative Dairy Company and Open Country Dairies have no position on the feeding of palm kernel by its suppliers and have given no indication they will do so in the near future (*pers comm*).

- Synlait announced last year a 'Grass Fed' infant formula initiative with US company Munchkin Inc. (Synlait, 2015). Suppliers are required to graze cows exclusively outdoors on a pasture and crop based diet, with no feeding of grain or feed not grown in New Zealand, in return for a 25c/kgMS premium.

6.9 Biosecurity

Palm kernel has come under the spotlight in New Zealand as a potential biosecurity risk, most notably after two Federated Farmers members visited palm oil processing plants in Malaysia in 2012 and raised their concerns (MPI, 2013).

MPI has Import Health Standards (IHS) for importation of PK which include heat processing, pre-export inspection, mandatory fumigation and consignment inspection by MPI on arrival. An MPI report (2013) indicated the most common interception from PK imports is *Diptera* flies, of which some are regulated species. MPI has investigated reported PK contaminants including an animal leg (which was found to be from a goat of New Zealand origin) and metal contamination which although not a biosecurity risk, poses concerns for feed safety.

MPI considers PK a negligible risk for introducing Foot 'n Mouth Disease (FMD) into New Zealand as the heat processing would destroy any FMD virus (FMDV). However it does acknowledge contamination of manufactured PK prior to shipment could be a source of FMDV introduction into New Zealand and that FMD is endemic in Malaysia (MPI, 2013).

7 Methodology

This project is intentionally qualitative and intended as a "pulse check", rather than a detailed statistical analysis.

7.1 Farmer criteria

Farmers interviewed were suppliers of Fonterra who fed palm kernel above the guideline recommended level of 3 kg/cow/day at any stage during the 2015/2016 season.

Farmers fitting the criteria were identified via the author's own networks, Fonterra Area Managers or farm consultant referrals. Due to this selection method, findings are likely to be biased towards industry-engaged farmers. Farmers were initially contacted to confirm eligibility, outline the project purpose and gain consent to interview.

7.2 Sample size and representation

The sample size was a subjective measure by the author after consultation with industry leaders and was intended to provide representation from different regions.

Ten farmers were interviewed from Northland (2), Waikato (1), Taranaki (2), Manawatu (1), Hawkes Bay (2) and Canterbury (2). Dairy farm consultants (3) and industry representatives (3) were interviewed. Face-to-face meetings were also conducted with Fonterra staff (3).

7.3 Interview

Farmers were asked structured interview questions (Appendix III A). Industry professionals and representatives were asked the same questions with the exception of questions directly relating to farm operations (Appendix III B).

All interviews were conducted by telephone. Interview times ranged from 45 minutes to 1 ¼ hours depending on the depth and expansion of answers given. Answers were then collated and analysed for similarities and differences.

8 Findings and Discussion

The following are the key findings from interviews conducted with farmers and industry professionals, and associated discussion.

The farmers interviewed represented an average stocking rate of 2.9 cows/ha (range 2.3-4.2) with herd size ranging from 225 to 1,400 cows. Production average was 1,253 kgMS/ha (range 770-2,307) and 432 kgMS/cow (range 320-550).

8.1 Reasons for use

Farmers were unanimous in that they were feeding PK for multiple reasons. These could be grouped under the six following themes:

8.1.1 Cost-effectiveness

"I have to concede a number of farm systems are being built around it and its availability, when priced at the level it is at."

The cost-effectiveness of PK as a supplementary feed source was given as a reason by all farmers for using it. Farmers felt the cost per tonne or kgDM made it a very attractive feed option. Some also mentioned the cost competitiveness of PK as an energy source (c/MJME) and protein source.

8.1.2 Consistency of product

Farmers felt palm kernel was a consistent product in terms of quality. They were confident they 'knew what they were getting' compared with variation of other home-grown or imported feeds, particularly grass silage or maize silage.

8.1.3 Ease of purchasing

The easy accessibility of PK and its year-round availability made it attractive to farmers. Many talked about the 'phone call' convenience of PK. The simplicity of purchasing, with no requirement for negotiation or a supplier relationship, was seen an additional benefit.

The PK 'pay as you go' effect on cashflow was seen as beneficial compared to bulk silages where a considerable payment may be made months in advance of the silage being fed.

8.1.4 Ease of management

"It's an easy feed to take in and out of the system very quickly with little impact on cow health."

"It's easy to feed and you don't need a high level of skill to feed it out."

The characteristics of PK allow it to be fed in high amounts with no required transition period and without any deleterious animal health effects. This wide safety margin for cows was viewed as extremely beneficial by farmers.

Other comments were that its low bulk (due to high dry matter %) meant less time feeding out compared with silage. It was considered easy to feed and store and required less capital investment in infrastructure compared with many other supplementary feeds.

8.1.5 Risk management

"We've had a good growing season – if we hadn't we would have fed more PK."

"We used to do summer turnips and that filled the summer deficit – but we can have good yields and poor yields."

PK was being used by farmers to manage feed and financial risk. Farmers were using PK to manage pasture supply-demand deficits, diet composition deficits (protein, energy), summer pasture quality issues, climatic challenge (wet winter, wet or dry spring, dry summer, water restrictions on irrigation, dry autumn) and adverse climatic events (drought, flood, snow).

By importing feed such as PK, farmers felt they were absolved of grower risk (yield and quality), in contrast to home-grown feeds where they carried this risk.

Most farmers were using price points to secure forward contracts for all or a percentage of their PK requirements. This gave them more certainty for cashflow budgets and protection from market price increases.

8.1.6 Animal performance

Farmers reported beneficial results from feeding PK in terms of production responses, efficiency of condition score gain in late lactation, efficiency of condition score gain in dry cows and the ability to extend lactation length.

"PK creates so much milk."

"Unparalleled to put condition on the cows while they're milking."

Some also mentioned the benefits they had experienced feeding PK to young stock for weight gain. This was either as a planned component of the diet or as a 'rescue remedy' in response to climatic challenge or being underweight.

"Feeding them [R2 heifers] PK, we can do with them in 6 months what a grazier can do in 12 months."

Industry professionals commented on the beneficial role palm kernel has played in lifting animal performance in the wider industry, in terms of production, condition score gain and extending lactation length.

"It's taught us a lot about the potential of our cows, that our cows are better than we thought they were."

"Most farmers don't have a good understanding of rumen function so PK has introduced them to a safe supplement

"If you have widespread drought at a regional level, PK is a major stock-feed to keep BCS and keep them milking."

8.2 Base, buffer or emergency response

There was considerable variation in the seasonal and daily feeding levels of PK fed by farmers. Seasonal input levels ranged from 265 kg/cow to 1.4 t/cow with an average of 668 kg/cow fed. Daily feeding levels (above guideline levels) ranged from 4 kg/cow/day to 7 kg/cow/day. On average, 1.5 kg PK was fed per kgMS produced for the 2015/2016 season. Four farmers had fed less PK this season compared to last season due to reaction to the lower payout and/or a better pasture growing season.

PK is being used in different ways by different farmers but ultimately their use could be classified as a base, buffer or emergency response, or a combination of.

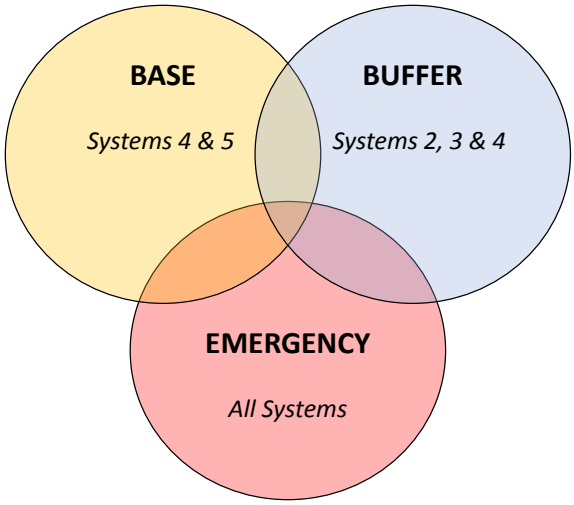

Figure 3: Classification of PK use

8.2.1 Base

Many farmers were using PK as a strategic supplementary base in their farming system. Feeding levels of PK were greater than 3 kg/cow/day for an extended period of time (60-120 days) or in the case of one farmer, the entire season.

Some farmers were using it to support higher stocking rates while others were using it as a base for predicted, prolonged climatic challenge, primarily summer dry. All identified with DairyNZ farm system 4 or 5 (Appendix IV).

Input was planned for, with all or a high proportion of the tonnage contracted in advance. The timing and input level was relatively consistent from season to season. Despite the high levels of input (4-7 kg/cow/day) most referred to its use as a 'top-up' or 'gap filler'.

North Island farms tended to use PK as a summer and/or autumn base with a few using it as an early spring base. Where it was a summer base, farmers routinely budgeted on a prolonged period of

summer dry. Some referred to PK substituting part or all of a summer turnip crop due to inconsistency with crop yield. One was using it as a winter base feed.

In the case of South Island irrigated farms, PK was used as a base in spring and autumn to support feed demand from high stocking rates which could not be met from pasture growth alone. Rates of input were as high as 4-7 kg/cow/day from August to September. From March to May, PK was fed at levels of 4-6 kg/cow/day to help extend lactation length while achieving condition score gain. Fodderbeet was considered a more cost-effective winter feed option than PK.

"We use it to basically fill the gaps so we can run a high SR and consume all grass in the peak"

8.2.2 Buffer

Some farmers were using PK tactically to buffer intakes when pasture growth was significantly below what was budgeted or expected. Examples of this were an uncharacteristically wet or dry spring, dry summer, irrigation water restrictions and/or dry autumn.

PK use tended to be a reactive response driven by challenging, unexpected seasonal conditions. The availability, accessibility and flexibility characteristics of PK were seen as extremely beneficial in these scenarios.

Farmers cited 'keeping production up' as well as mating performance and cow condition as reasons they would use PK in these situations.

"A cow's feed demand doesn't fluctuate like pasture growth does."

8.2.3 Emergency response

PK had also been used as an emergency feed by some farmers during adverse climatic events such as drought, flood or snow, in some cases as the sole feed in the diet due to necessity.

"We had 19 inches of snow that lasted 3 weeks. We had no power for 13 days. We didn't have facilities, we just had to feed it (PK) out in the paddock."

8.3 Importance to the farm business

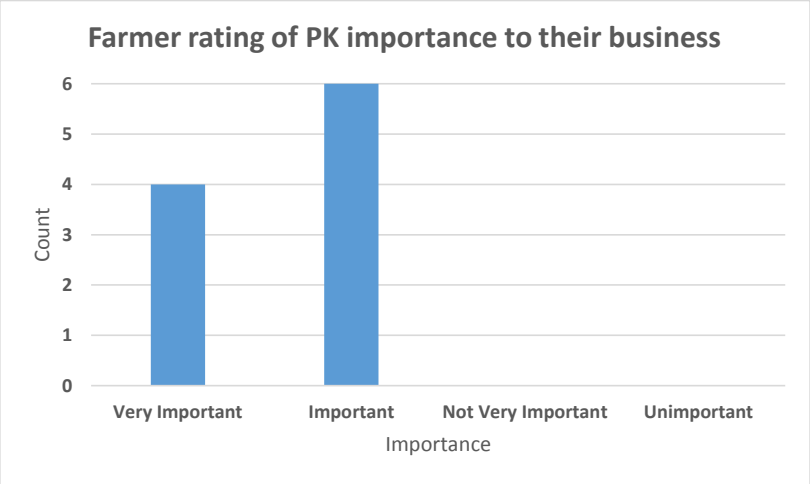

Figure 4.

All farmers interviewed rated PK as either 'important' or 'very important' to their business. Although this may not be surprising given the aforementioned reasons and the interview selection criteria, there was considerable variation in the input and timing of PK feeding between farmers. This gave further insight that the reasons for its importance can differ significantly between farmers, farms, regions and seasons, because of the different goals and strategies they have and the different internal and external challenges they face.

"It's very important, mainly because I like my cows to milk well and look well and I don't like being in the cowshed if they're not."

"To run the system I'm running it is important but at the same time I could change it overnight and potentially get the same result."

Many farmers made comment that their use of PK had increased over time. For some this was intentional due to an increase in system intensity or to take advantage of the flexibility and consistency PK provided. For others it appeared unintentional, supporting the 'creep effect' theory (Mounsey, 2015), whereby supplementary feed inputs incrementally increase over time.

"It was never our intention to be so reliant on PK."

"It [PK] came in as a substitute and is now a base point for the business."

8.4 Farmer understanding of the guideline

There was a degree of farmer uncertainty around the rationale for the guideline, driven by a lack of clear message and supporting evidence from Fonterra. Farmers understanding of the rationale could generally be grouped as milk composition creating processing issues, or customer perception and requirements, or both.

There were contrasting and conflicting views on the impact implementation of the guideline would have on milk payment, specifically whether it would be a new basepoint for business or add extra value.

8.4.1 Rationale

8.4.1.1 Milk composition creating processing issues

"PKE does not affect the natural goodness of milk and does not significantly affect the percentages of fat/protein and other major components within the milk. However, at high levels it can affect the ratios of the various components in milk fat."

"…the wider commercial and regulatory environment continues to evolve."

Fonterra Co-operative Group (2015)

There was a general acceptance by farmers that if palm kernel was adversely affecting milk composition for processing then they would adapt to feeding lower levels. If so, farmers questioned why this wasn't stated in the initial correspondence about the guideline.

"I can't feed my cows something that they [Fonterra] can't do anything with and can't sell."

"Is milk composition a big enough reason? I think bigger things are at play here."

"If they had gone to farmers and said we're having issues with this and this, then we would have listened."

8.4.1.2 Producing what the customer wants

The guideline letter to suppliers (Appendix I) had repeat references to increasing global consumer expectations. Farmers echoed these sentiments.

"You have got to do what the customer is prepared to pay for. At the end of the day someone has got to pay you for your milk."

"The processing side of it is one thing. The market will ultimately dictate what we will do."

"Personally I think we as farmers are going to have to think more about where our end products go – it's not just about supplying milk."

8.4.2 Impact on milk payments

8.4.2.1 A new basepoint for business

"Once I cut out PK I think it [milk] will be a much better product but we won't get paid a premium for it."

"If I'm producing something no one wants, it doesn't make good business sense for me to keep doing it."

There was some farmer sentiment that implementation of the guideline could become 'business as usual' if milk composition was the primary issue. They saw the guideline progressing to a rule at some

point in the future, with milk testing and an associated demerit system. The latter would address potential inequity issues with compliance vs non-compliance.

"If some farmers are giving up their cheapest feed to give them [Fonterra] the product they want versus their peers continuing to use it at higher levels, there is a high degree of inequity."

8.4.2.2 Adding value

In its communication to suppliers (Appendix I), Fonterra stated that a premium is already being fetched for its pasture-based milk supply, but opportunity existed to create more value.

"Milk products from New Zealand already command a premium over milk products from other countries.

We want to build on this as we believe there is a real opportunity to create more value for you, our farmers."

Fonterra Supplier Letter (Appendix I)

Farmers frequently questioned how successfully Fonterra was marketing its pasture-based, grass-fed systems to extract value. There wasn't a consensus on whether the PK guideline would add additional value or not.

"People get confused when they [Fonterra] say we need to be grass competitive – aren't we already?"

"If there is a perception side to it, it has to be shown to generate extra value."

"We're not getting a premium for milk powder produced from a pasture-based system."

There was also commentary from some that there was perhaps 'more to add' to extract value because restricted PK milk could not attract a premium of its own accord.

"We're either producers of commodities at the lowest cost and it's all about the numbers. So we're happy to get the world price, sell to anyone and feed as much PK as we can. Or we look at the value proposition - who we want to feed and what we want to feed them."

"I'd throw PK out the window straight away if there was a premium for not feeding it."

Interestingly, although there was farmer acknowledgement of customer expectation, there was no commentary around whether continuing to have unrestricted PK fed to cows could de-value or discount products, now or in the future.

8.4.3 Assessing feeding levels

It was interesting to note that only one farmer interviewed was aware of a milk test being developed. This farmer had attended a shed meeting about the PK guideline. Other farmers were unsure how Fonterra could accurately assess the level of daily PK feeding.

8.4.4 Detailed aspects of the guideline

"Farmers quite rightly are demanding a level of proof for what Fonterra is asking them to do."

Farmers were not clear about many aspects of the guideline. They considered proof, clarification and detail was required around factors important to the strategy and management of their farm businesses. These included:

Milk composition effects

- Clarification if a 'lag period' exists between feeding and milk composition changes
- Effect of feeding levels at different stages of lactation
- Effect of feeding levels at different levels of production
- Interaction between feeding levels and body condition score gain or loss
- Genetic/breed differences

Non-lactating stock

- Policy on dry cows
- Policy on young stock

Extreme cases

- What happens in an adverse climatic event?
- What happens if animal welfare is at stake?

During the research interview for this project, Fonterra made it clear the guideline did not apply to non-lactating dairy cows, or young stock (Maclean, B., pers. comm., 9 June 2016).

8.5 Impact of implementation

8.5.1 Who will be affected?

One consultant interviewed commented on the use of PK in the industry:

"Very few farmers feed 1 kg PK/cow/day. A lot feed 2 kg/cow/day. Some feed a lot for a short time. Very few feed a lot for a long time."

If these observations are reflective of the industry, and as no industry data is available on PK daily cow feeding levels on-farm, it could indicate that implementation of the guideline will impact only a small proportion of Fonterra's supply base.

Consultants were in agreement that mainly system 4 & 5 farmers would be *most affected* by the guideline but that they would make system adjustments accordingly. However it was felt the *most*

vulnerable would be system 2 & 3 farmers using PK as a buffer or all systems in an adverse climatic event.

8.5.2 Effect on stocking rate and production

"We would probably drop stocking rate as a long-term strategy by 10% and accept a drop in production of 5-8%. We've got room to improve where we are now."

Farmers discussed the impact of implementation in terms of the anticipated stocking rate adjustment they would make and the reduced production they would expect as a result. In all cases, the magnitude of the stocking rate reduction was greater than the anticipated production drop. This indicated that farmers felt there were efficiency gains to be made from optimisation of their farm feed systems.

8.5.3 Risk of replacement

Industry professionals were more concerned with the 'risk of replacement' – that farmers would replace the additional PK with an alternative that was more expensive, of lesser quality and/or a more bulky feed, of which the latter could compromise drymatter intakes. Consideration of the risk and/or opportunity of home-grown feed (yield, quality and cost) versus that of imported feed (price, quality and availability) versus non-replacement, was strongly recommended.

"The potential downside risk is huge, especially if they simply look to replace it (PK) with the next cheapest supplement."

"The more expensive the feed they put in, then the more milk per kg liveweight and per kg feed they must get, otherwise they lose the relative productivity gain."

However, there was also commentary from industry professionals that, if farmers were well prepared and utilised tools and resources available to optimise their farm system, the impact could be minimal.

"We have learnt in the last 12-18 months that we could lose PK with no real impact in the system by getting better in other areas and negating the disadvantages."

8.5.4 Challenges to compliance

Extreme climatic events were considered most likely by all farmers to put them at risk of breaching the PK feeding guideline. Animal welfare and availability of cost-effective supplementary feed under adverse climatic conditions were seen as factors most likely for farmers to elect to breach the threshold for penalties. Farmers were vocal in their concern around these issues.

"Animal welfare is something that would keep me awake at night. It would be stressful not being able to bring enough food in through the gate, whether it's profitable or not."

"Do they [Fonterra] want an animal welfare case? Look at the Waikato droughts, the fact that cows got through those was through the high use of PK. Do we want to go back to where we were 8-9 years ago with no ready supply of silage or baleage?"

Some farmers and industry professionals indicated they would consider intentionally breaching the guideline in the short-term if it delivered favourably to the long-term strategy of the farming enterprise.

"… highly likely if it's financially worthwhile, that's the crux of it. If cows are hungry and you need to feed them something… if it's going to be cheaper than the alternative then you'll feed it and take the penalty."

"The guideline wouldn't stop me from recommending up to or over the feeding threshold if the farm could gain strategic value from doing so."

8.6 Implementation

Implementation of the guideline will require alteration of farm practices. This will be driven by farmer consideration of individual circumstances, payout signals and feed costs. It is likely change will be driven by milk price signals from Fonterra.

8.6.1 Change will be driven by rule and consequence

"They'll [farmers] take as long as they're given. Fonterra will need to drive this. Farmers will adapt to this very quickly as they have already with milk price signals."

Fonterra intend to start testing milk in the 2016/2017 season under the voluntary guideline conditions (Maclean, B., pers. comm., 28 April 2016). The unknown for farmers is the timing of mandatory implementation through the anticipated introduction of associated penalties (demerits).

It is likely suppliers who are feeding above the guideline maximum recommended level of 3 kg/cow/day will take as long as they are given to adhere. However, as quoted above, they will adapt very quickly once an associated penalty signal is given.

"I would ignore it (the guideline) until it came to a point where I couldn't ignore it."

For a large majority of farmers interviewed, change to adhere to the guideline will be incremental. Very few will require transformational change to their systems – many have already done so in response to the low payout environment they are experiencing, by reducing stocking rate and/or reducing input of supplementary feed. This has effectively created a 'window of opportunity' for Fonterra to follow the introduction of milk testing with an associated penalty/demerit system, after a deemed suitable transition period.

The main challenge for Fonterra will be to genuinely and effectively consult and communicate with suppliers during the transition and implementation periods. The testing regime must be robust, accurate and consistent under a range of field conditions. Another important factor is the frequency of testing, given farmers may adjust or manipulate feeding levels of PK based on their previous test.

8.6.2 Altered farming practices

Farmers were asked to consider how they would alter their farming practices if the PK guideline progressed from voluntary to mandatory. They indicated they would reduce feed demand, reduce feed supply (non-replacement) or use an alternative feed supply, or a combination of both, to achieve

a maximum input of 3 kg PK/cow/day. All farmers interviewed had already made changes to their farming system, addressing the challenges of feed demand and supply in a low payout environment.

Farmers and industry professionals highlighted the opportunity to minimise or negate the impact through optimisation of their farming systems.

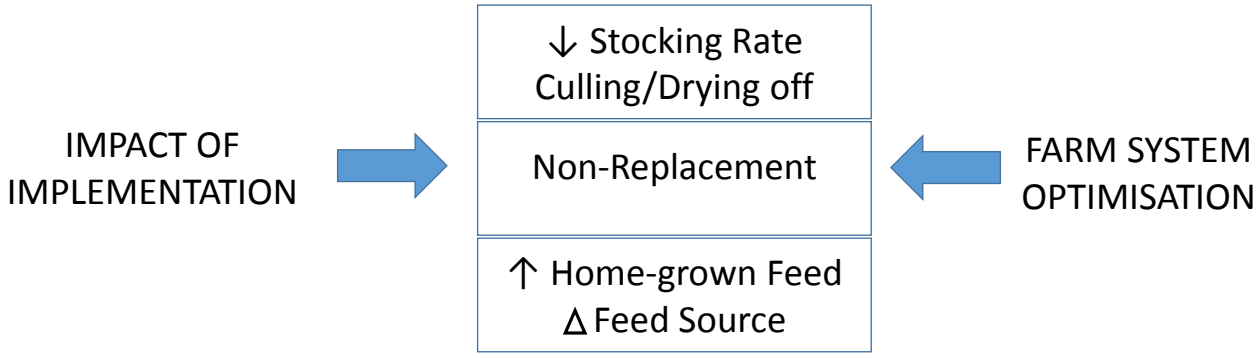

Figure 5: Implementation of the PK Guideline: Options, Impact & Optimisation

Industry professionals stressed the need for planning.

"Our advice to farmers is to plan. Look at feed demand, not just feed supply. Reorganise your existing feed."

8.6.3 Reduced demand

8.6.3.1 Reduced stocking rate

Feed demand would be reduced by decreasing stocking rate (cows/ha) of up to 10%. Higher stocked farms indicated a further reduction in stocking rate may be required if/when the PK guideline became mandatory. These farmers had already made stocking rate reductions in response to the low forecast 2015/2016 milksolids payout.

"The nutritive value (of PKE) is not irreplaceable but if it goes and everything else becomes more expensive then we will have to look at our system. If it doesn't stack up feeding silage then we'll adjust our stocking rate to match."

8.6.3.2 Culling and drying off decisions

Many farmers indicated they would manipulate demand in feed deficits by making earlier and/or more aggressive decisions around culling and/or drying cows off. However the risk of inefficiencies from reduced lactation length was highlighted by farm consultants.

8.6.4 Reduced supply

Not replacing the amount of PK above 3 kg/cow/day was considered an option by farmers who were using it as a buffer.

"When we have a supply and demand challenge, it won't be automatic to just put feed in."

8.6.5 Alternative feed supply

8.6.5.1 Increased home-grown feed

"Is there a limit on home-grown feed? I honestly don't think we're anywhere near it yet."

A focus on increased home-grown feed supply was unanimously identified as an option for replacing PK currently fed above guideline levels. Increasing pasture grown and pasture harvested per hectare was the primary focus for all farmers surveyed. All farmers were confident they could make gains in these areas with a renewed and improved focus on pasture management. Reviewing use of nitrogen and/or gibberellic acid was also mentioned by some.

Home-grown crop (including on run-off support land) was also a key focus for increasing feed supply. Fodder beet was the most mentioned crop option in the South Island, for support of late lactation demand and potentially an option for early spring support of stocking rate demand. Many North Island farmers felt their main opportunity with home-grown crops was to grow more maize silage on-farm however fodder beet was also discussed as a viable autumn option for the lower North Island. Farmers using PK as a buffer discussed the need to have more reserve of silage on-hand.

While most farmers were still intending to use PK, it was interesting to note that two farmers interviewed were looking at alternative revenue streams in response to the lower payout environment. Both were looking to transition to organic milk supply in the coming season and consequently remove PK from the diet permanently.

8.6.5.2 Alternative imported supplement

"There is always a substitute. You just have to scratch a bit harder to find it."

Grains, maize silage, grass silage, vegetables (potatoes, beetroot, peas) and PK blends with dried distillers grain (DDG) or tapioca were considered alternative feed options to high PK, depending on their price, availability and the feeding system used on-farm (e.g. trailer, in-shed, on ground, feedpad).

Alternative supplementary protein options for summer and prolonged dry periods were turnips, grass silage and canola or soya (the latter two fed with maize silage or as a blended feed).

Tradable fodder beet was also mentioned by industry academics and consultants as an option, particularly in the South Island.

8.7 Transition

8.7.1 Farmers will work the system out, then work the system

During the milk testing transition period, farmers will work out individually what factors keep them above or below the penalty threshold, using 3 kg/cow/day as a guideline.

In time, it is likely the amount of PK fed per cow per day could become largely irrelevant on a 'one-size fits all' basis as individual farmers 'test the test' to work out what amounts they can or can't feed at different stages of lactation to remain compliant.

"I would say the amount of PK a day which pushes milk characteristics will be quite variable."

"We'll see what the cows test and then try and manipulate the test somehow.
Can we get away with 4 kg/cow/day?
My feeling is we'll probably be alright due to our level of production.
If not, we'll adjust accordingly."

8.7.2 Twelve month transition to implementation

Feedback from farmers was they would need a complete season (12 months) to transition to adhere to the guideline. Reasons given were time for system adjustment and commitment to signed PK contracts. Having milk composition test results available during this time would enable farmers to get feedback on implemented changes to PK input levels ('testing the test') before penalties were introduced.

8.7.3 Ability of dairy farmers to adapt

The adaptability of farmers came through very strongly when commenting on the timeframe required for implementation. Some indicated that they could make the transition in less than 12 months if timely communication and signals were given.

"Farmers are very adaptive as long as they get adequate information."

"We could do it overnight – accept you're going to feed less, feed other feeds or milk less cows. It's not that hard to change."

8.8 Looking to the future

8.8.1 Response to a nil PK directive

Interviewees were asked what they thought the likelihood of a future nil PK directive from Fonterra would be and were given the following phrases to choose from; highly likely, likely, unlikely or highly unlikely (Figure 6).

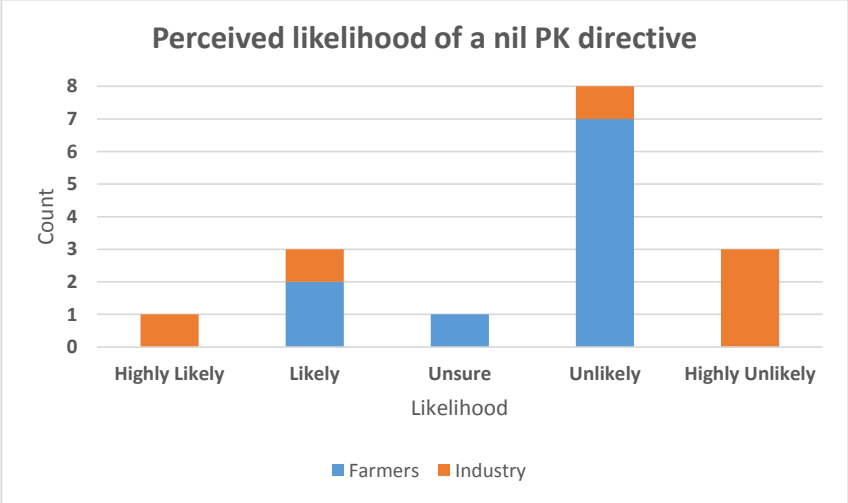

Figure 6.

Seven out of ten farmers and four out of six industry professionals felt a future nil directive was unlikely or highly unlikely to happen. Justification for this were that the guideline level should address any milk composition issues, a belief that consumer demand and willingness to pay a premium to drive such a change was unlikely and Fonterra would lose a significant portion of their supplier base to competitors by having a nil directive.

"If Fonterra did it on its own it would be very difficult for them to maintain supply. There would be a serious backlash. There would need to be a serious premium attached to it [for it to work]."

"There's certainly pressure on Fonterra around the use of PK but the extent of it coming back from the markets is hard to see."

"If we're too reliant on PK in our systems then potentially we open ourselves up to risk. I assume at the moment if it's kept to a manageable level and not a dominant part of the diet it will be ok."

Justification for a 'likely' or 'highly likely' response was based around a longer term view of sustainability issues with PK feeding.

"Ultimately 3 kg/cow/day will not be far enough. It will address product issues but not really deliver to sustainability issues – issues that count."

"Much better to have it [guideline] in place now, then in future they could choose to segregate no PK milk from mainstream milk or phase it out altogether."

"If we all got on a plane and went to Indonesia we'd all come back and cancel our PK contracts."

8.8.2 Transition to a nil PK directive

Despite their belief that a nil PK directive was unlikely, farmers felt they could transition to a nil PK system, on average, over two or three seasons. The only detailed analysis of impact from a corporate farming representative indicated the impact of transitioning to nil PK could be up to 6c/kgMS (*pers. comm.).*

9 Conclusion

In response to an increasing amount of PK fed to dairy cows by its suppliers, Fonterra Co-operative Group announced the introduction of a PK guideline in September 2015, recommending a maximum feeding level of 3 kg/cow/day. Further communication indicated a milk test was being developed to assess PK feeding levels.

Interviews with farmers and industry professionals indicated implementation of the guideline is achievable. Options identified included reducing feed demand through stocking rate, culling and drying off decisions, accepting reduced feed supply or increasing supply from home-grown feeds or alternative imported feeds. The impact of the guideline on farmers will be dependent on the degree of change required to adhere to the guideline, their ability to optimise their farming system and the climatic challenges they face.

Farmers indicated a twelve month period would be required for transition, during which time they would challenge milk test thresholds on-farm. It is likely there will be variation in PK feeding levels between farms and different stages of lactation to achieve compliance.

The clear message from farmers was the need for Fonterra to provide more proof and clarity. Farmers were unclear whether the guideline rationale was based on milk composition, customer expectations around sustainability or product specification. There was also need for proof and clarification around factors affecting milk composition on-farm.

While farmers did not believe a future nil PK directive was likely, they indicated they could transition over a 2-3 year period to a nil PK system. Interestingly, some non-farmer interviewees thought a nil PK directive was inevitable in the future due to customer expectations around sustainability.

The PK guideline has created an opportunity for Fonterra to develop a NZ grass-fed certification standard and investigate a 'grass-only, home-grown' specialty milk pool. Developing a "Know Your Customer" programme will help Fonterra farmers understand and better connect with their markets and end-consumers.

10 Recommendations

Implementation of the Fonterra PK Guideline will likely require incremental changes by most dairy farmers currently feeding over 3 kg/cow/day. The following recommendations are made to Fonterra, Fonterra farmers and industry professionals and support organisations with a view to the successful implementation of the guideline and minimal impact on farm operations.

10.1 Fonterra

10.1.1 Provide more clarification and proof for farmers

Fonterra needs to communicate clearly to farmers the rationale behind the PK guideline and provide evidence to support this. Farmers want to see research findings that justify what Fonterra is asking them to do and provide clarification around a number of factors associated with the guideline.

10.1.1.1 Milk Composition

If the key driver of the guideline is milk composition, then farmers are generally supportive of, and understand, the need for reduction in the level of PK fed but require more information to assist them with PK feeding decisions.

Although some research may be commercially sensitive, clarification and/or proof is needed around a number of different factors that will affect farm business strategy and seasonal and daily management (Detailed aspects of the guideline, p23). It is recommended Fonterra provide further information to farmers around seasonal and management factors once sufficient milk testing data is available and on-farm validation is carried out.

10.1.1.2 Customer expectations

If market demands, such as customer expectations around sustainability and/or product specification, are the key driver of the guideline, then farmers need clarification around whether the guideline is a new basepoint for business or is adding value. Providing market research information and/or consumer trends around sustainability will help deliver confidence to farmers that justifies the rationale.

10.1.2 Minimum 12 month transition period to implementation

Farmer feedback indicated they would need a minimum transition period of 12 months (a full season) to implement the PK guideline. This timeframe was based on the need to make strategic and/or operational changes and a commitment to existing PK contracts. It is recommended Fonterra align their implementation plan with these findings.

Farmers and industry professionals believed there could be significant variation in PK feeding levels between farms and within seasons that would breach milk testing thresholds. Given this, it is recommended that Fonterra ensure milk testing results are provided to farmers, without associated penalties, for a minimum of twelve months. Farmers that intentionally don't comply during the

transition period have indicated they will adapt very quickly once any associated milk price signal is given.

Due to the current low payout environment and reduced use of supplementary feed, it is recommended Fonterra commences milk testing for the 2016-2017 season if the test is robust and ready for release as there is a risk that any milk price signal increase could result in an increase in the level of PK feeding.

10.1.3 Communicate policy around PK use in adverse climatic events

Farmers stated it was likely an adverse climatic event such as drought, flood or snow would cause them to breach mandatory PK feeding guidelines. Compromising animal welfare during adverse climatic events would be unacceptable for farmers and would also compromise product integrity and the Fonterra brand.

It is recommended Fonterra communicate policy around PK use in adverse climatic events including how it will respond to formally declared drought or civil emergency events. Communication to farmers must be clear about the exclusion of non-lactating cows and young stock from the guideline and what the implications of higher levels of PK feeding to lactating cows would be, whilst not compromising animal welfare. A manufacturing response plan would also be needed to address potential milk composition issues if feeding guidelines were breached on a significant scale, as farmers have indicated they would be likely to do so.

10.2 Farmers affected by the guideline

10.2.1 Have a planned approach to implementation

Farmers are strongly encouraged to plan their approach to implementation of the guideline by careful consideration of the options available and their potential impact.

A first step is to carefully consider what role PK is playing in their farm system (base, buffer and/or emergency response), how significant it is and when it is used. Farmers then need to identify their best options, consider the impact and how optimisation of their farm system could minimise or negate this. Use of modelling systems for farms currently using PK as a high level base is recommended.

Feed demand considerations include review of stocking rate and the nature and timing of culling and drying off decisions. Feed supply considerations should start within the farm gate. It is recommended farmers look to reorganise their existing feed in the first instance, before replacing additional PK with alternatives. Farmers need to identify what could be achieved with increased focus on pasture management and secondly what crops could be grown on-farm (including run-off blocks) for better yield and/or lower cost.

Farmers need to be clear what the impact will be of replacing some PK with an alternative feed. The ‘risk of replacement’ is real, whereby the outcome from an alternative feed is less beneficial than what it replaced.

Farmers also need to consider how the guideline could influence how they would respond to an adverse climatic event, such as drought, flood or snow.

10.2.2 'Test the test' during transition

It is likely there could be significant variation in PK feeding levels between farms and within seasons that would breach milk testing thresholds. Therefore, individual farmers have the opportunity to work out what PK feeding levels keep them compliant.

It is recommended farmers 'test the test' once milk testing is underway and before penalties are introduced. In doing so, it is likely they may be able to answer some of their questions around aspects of the guideline, specific to their own situation. This could include the effect of stage of lactation, level of production and 'lag' period between PK feeding and milk test result changes.

10.3 Industry professionals and organisations

10.3.1 Provide evidence-based advice to farmers

Farm consultants, industry professionals and industry service organisations need to provide evidence-based advice to farmers around options and impact of implementation of the PK guideline. Consideration must be given to strategic advice as well as operational advice and the impacts of these on the farming enterprise. The 'risk of replacement' must be conveyed to farmers, quantified and understood.

There is a need for research and expertise to support farmers in their quest for increasing the supply of home-grown feed and tools to assist in determining the optimum level of home-grown feed. The use of computer modelling by the sector and sharing of results is encouraged, as is on-farm validation of models.

10.3.2 Provide education around alternative feeds

Some farmers will need education and expertise if using or growing alternative feeds they are not experienced with, from both management, animal health and financial perspectives.

Feeds such as fodderbeet, by-product fruit or vegetables, tapioca, dried distillers grain (DDG), soy and canola may require specialist information and advice.

10.4 General recommendation

10.4.1 Make transition and implementation a shared experience

It is recommended that learning from the guideline implementation process be a co-ordinated, shared experience between Fonterra, Fonterra farmers and industry professionals and organisations. In doing so, implementation can occur in an informative, supportive environment with the least detrimental impact to farming businesses.

11 Beyond the Palm Kernel Guideline

During the process of interviews, it became apparent there was a genuine feeling there was opportunity for Fonterra and Fonterra farmers to add more value to their products and understand their market.

Although this was outside of the scope of this project, it was also highly relevant. The following recommendations for Fonterra are based on these insights:

11.1.1 Develop a "Know Your Customer" programme for suppliers

There is a need and opportunity for Fonterra to engage suppliers and forge a stronger connection and understanding between Fonterra farmers and their customers – whether the latter be of an ingredient or consumer of an end-product.

Fonterra farmers want and need to better understand who their customers are, and more importantly, what they want and what they are prepared to pay more for, now and in the future. There are a range of possibilities as to how this could be delivered, including a road-show, a programme similar to the "Know Your Co-operative Programme" Fonterra already has in place and/or an organised overseas tour to Fonterra customers and markets.

11.1.2 Develop a New Zealand grass-fed certification standard

It is time for a discussion around how the New Zealand dairy industry can set parameters or minimum standards for 'New Zealand certified grass-fed dairy' for collective advantage. In taking a position on PK feeding levels, Fonterra is well placed to lead this discussion.

An industry-certified standard would ideally be reached through collaboration of all NZ dairy companies, with the united intention of protecting the integrity of the industry and the brand advantage of New Zealand dairy products, both now and into the future. If collaboration is not achievable, Fonterra needs to be proactive and develop their own certification standard.

11.1.3 Investigate opportunity of 'grass-fed, home-grown' specialty milk pool

Many farmers are currently looking to increase their revenue stream, driven by the current low payout situation. Many Fonterra farmers have already done so, supplying specialty organic milk or winter milk, both which attract a premium but require a significant system change to do so.

Opportunity exists for Fonterra to investigate a 'grass-fed, home-grown' specialty milk pool. This could add collective value to the Co-operative, while providing supplying farmers with an opportunity to earn a milk premium, reflecting the constraints on feed options.

Given that some of Fonterra's competitors, Synlait and Danone, are already operating in this space, it would seem prudent for Fonterra to investigate this further.

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Appendix I

Fonterra letter to suppliers

Hi < > ,

More than ever consumers around the world are aware of where their food comes from.

Our pasture-based farming system is becoming more important to our consumers and gives our Co-op, and you, a real competitive advantage in selling our products overseas.

We want to future-proof our position as a trusted supplier of pasture-based milk. Milk products from New Zealand already command a premium over milk products from other countries. We want to build on this as we believe there is a real opportunity to create more value for you, our farmers.

We are in a unique position to maintain a pasture-based milk pool in New Zealand at scale. Already on GDT a premium is often paid for products made from New Zealand milk compared to products made from milk sourced from other countries. Consumers love New Zealand dairy products and we want to increase that value by ensuring our New Zealand milk comes from predominantly grass-fed cows.

To achieve this we are establishing guidelines for the use of Palm Kernel Expeller (PKE) as a supplementary feed for dairy cows. We know that after pasture, PKE is one of the cheapest supplementary feed options, that use of PKE is increasing and that the wider commercial and regulatory environment continues to evolve.

Going forward we are recommending a maximum of 3kg of PKE/per cow/per day. We believe that these guidelines will help our farmers maintain their reputation for pasture-based farming, while upholding our high standards of animal welfare, particularly during adverse weather conditions.

Currently, these guidelines are voluntary and we will work with you to help you maximise on-farm profitability while ensuring the health of your herd. The animal feed records that you already provide as part of your annual dairy assessment currently give us traceability of feed supplements. Our next step is how we can use these records to help you measure your use of PKE, and in future seasons there is the possibility that guidelines around PKE could become part of our terms and conditions of supply.

You know the milk you supply the Co-op has an excellent reputation around the world. To maintain that, and stay ahead of global consumer expectations, these guidelines will ensure we maintain our competitive advantage and continue to produce high-quality products that consumers love.

Please feel free to contact your Area Manager or me if you have any questions about these guidelines.

Kind regards,

Head of Co-operative Affairs
Fonterra Co-operative Group Limited

Appendix II

FONTERRA ENHANCES REPUTATION AS WORLD-LEADING DAIRY PRODUCER

21 SEPTEMBER 2015

Fonterra Co-operative Group Limited is taking steps to future proof the Co-operative's position as a world-leading and trusted producer of pasture-based milk products and to stay ahead of global consumer expectations.

Fonterra Group Director Co-operative Affairs Miles Hurrell said that consumers globally are driving a trend towards dairy products that are sourced from pasture-based milk.

"More than ever consumers want to know what is in their food and where it comes from.

"We are in a unique position to make the most of this trend to enhance returns to our farmers who are already renowned for producing the best milk in the world. This recognition is a direct result of our farmers' pasture-based farming model.

"This gives us a key competitive advantage globally. Our milk products have an excellent reputation and we want to maintain that, and stay ahead of increasing consumer expectations. Already on GDT a premium is often paid for products made from New Zealand milk compared to products made from milk sourced in other countries.

"Consumers love New Zealand dairy products and we want to increase that value by ensuring our New Zealand milk comes from predominantly grass-fed cows," said Mr Hurrell.

In addition, the wider commercial and regulatory environment continues to evolve.

Mr Hurrell said given these factors it was important that the Co-operative future-proofed its position as a supplier of high-quality pasture-based milk products.

This commitment has seen Fonterra today advise its farmers that it is establishing guidelines for the use of Palm Kernel Expeller (PKE) as a supplementary feed for dairy cows. Going forward the Co-operative is recommending PKE guidelines to its farmers of a maximum of 3kg/per cow/per day.

"After pasture, PKE is one of the cheapest supplementary feed options for farmers, and our data shows that use of PKE is increasing. We recommend our farmers follow these guidelines in order to future-proof the Co-operative's position, while upholding our high standards of animal welfare.

"The recommended maximum of 3kg/per day/per cow is a voluntary guideline and we will be working with our farmers to help them maximise on-farm profitability while ensuring the health of their herd," said Mr Hurrell.

Appendix III

A) Farmer Interview Questions

General Questions

1. Farm location (Region, District):
   Characteristics of area and/or farm:
   Effective hectares:
   Seasonal/split/TAD/OAD:
   Farm system (DairyNZ 1-5):
   Production forecast 15/16 season:
   Cows peak milked 15/16:
   Production 14/15 season:
   Cows peak milked 14/15:

PK use on-farm

2. Why does PK currently feature in your farm system?

3. Importance
   a) How important is PK to your farming business?
   Options: Unimportant / Not very important / Important / Very important
   b) Why is this?

4. How many tonnes (wet) of PK will you feed this season? Last season?

5. Feeding in excess of 3kg/cow/day PK this season:
   a) For how long (days/months) and for what parts of the season?
   b) What will daily maximum levels be?
   c) What is driving this level of input?

6. Has your farm exceeded 3 kg/cow/day PK in previous seasons? <u>If yes:</u>
   a) For how long (days/months) and for what stage of season?
   b) What were daily maximum levels?
   c) What was driving this level of input?

7. What purchasing strategy do you apply to PK?

Fonterra PK guideline of maximum 3 kg PK/cow/day

8. The guideline
   a) What do you understand are the reasons behind the Fonterra guideline?
   b) How are you going to approach the guideline?
   c) The directive of max 3 kg/cow/day is currently a guideline.
      Do you see this progressing (if at all)?

9. Changes required
   a) What changes will you make if the guideline becomes mandatory?
   b) What would be the impact of these changes?

10. Timeframes
    a) What do you think is a realistic timeframe for you to adhere to the guideline if it became mandatory?
    b) Why is this?

11. Exceeding the threshold
    a) Is there anything that could put you at risk of going over the recommended threshold?
    b) How likely is this to happen (for each example)?
       Options: Highly likely / Likely / Unlikely / Highly unlikely
    c) What could you do to prevent going over the threshold?

Farming without PK

12. Nil directive
    a) How likely do you think a nil PK directive is?
       Options: Highly likely / Likely / Unlikely / Highly unlikely
    b) Why is this?

13. What changes would you need to make on-farm to achieve a nil PK input?

14. What time-frame would you and your farm need to make this achievable?

Wrap-up

15. Do you have anything else you would like to add?

B) Industry Professional Interview Questions

General Question

1. In your opinion, why is PK being fed on NZ dairy farms?

Fonterra PK guideline of maximum 3 kg PK/cow/day

2. The guideline
   a) What do you understand are the reasons behind the Fonterra guideline?
   b) How should farmers approach the guideline?
   c) The directive of max 3 kg/cow/day is currently a guideline. Do you see this progressing (if at all)?

3. Changes required
   a) What changes will farmers need to make if the guideline becomes mandatory?
   b) What would be the impact of these changes?

4. Timeframes
   a) What do you think is a realistic timeframe for farmers to adhere to the guideline if it became mandatory?
   b) Why is this?

5. Exceeding the threshold
   a) Is there anything that could put farmers at risk of going over the recommended threshold?
   b) How likely is this to happen (for each example)?
   Options: Highly likely / Likely / Unlikely / Highly unlikely
   c) What could farmers do to prevent going over the threshold?

Farming without PK

6. Nil directive
   a) How likely do you think a nil PK directive is?
   Options: Highly likely / Likely / Unlikely / Highly unlikely
   c) Why is this?

7. What changes would farmers need to make on-farm to achieve a nil PK input?

8. What time-frame would farmers need to make this achievable?

Wrap-up

9. Do you have anything else you would like to add?

Appendix IV

(Retrieved from http://www.dairynz.co.nz/farm/the-5-production-systems/)

As New Zealand pastoral farming is about profitably balancing feed supply and demand, five production systems have been described by DairyNZ primarily on the basis of when imported feed is fed to dry or lactating cows during the season and secondly by the amount of imported feed and/or off farm grazing. The definitions do not include grazing or feed for young stock.

System 1 - All grass self-contained, all stock on the dairy platform

No feed is imported. No supplement fed to the herd except supplement harvested off the effective milking area and dry cows are not grazed off the effective milking area.

System 2 - Feed imported, either supplement or grazing off, fed to dry cows

Approximately 4 - 14% of total feed is imported. Large variation in % as in high rainfall areas and cold climates such as Southland, most of the cows are wintered off.

System 3 - Feed imported to extend lactation (typically autumn feed) and for dry cows

Approximately 10-20% of total feed is imported. Westland - feed to extend lactation may be imported in spring rather than autumn.

System 4 - Feed imported and used at both ends of lactation and for dry cows

Approximately 20 - 30% of total feed is imported onto the farm.

System 5 - Imported feed used all year, throughout lactation & for dry cows

Approximately 25 - 40% (but can be up to 55%) of total feed is imported.

*Note: Farms feeding 1-2kg of meal or grain per cow per day for most of the season will best fit in System 3.