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To: NZ ETS Review Consultation
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Submission on: **New Zealand Emissions Trading Scheme Review 2015/16 – Stage 2**

From: DairyNZ

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1. INTRODUCTION

1.1 DairyNZ welcomes the opportunity to submit to the Ministry for the Environment (MfE) on stage two of the New Zealand's Emission Trading Scheme (ETS) Review 2015/16.

1.2 As stated in our submission on stage one of the review, DairyNZ supports the Government adopting an approach to New Zealand's domestic climate change policy framework which looks at the bigger picture and develops a long term plan to achieve the overarching objective of transitioning to a low carbon economy. DairyNZ acknowledges that in order to achieve this goal, action will need to be taken to reduce biological nitrous oxide and methane emissions.

1.3 DairyNZ supports establishing an alternative policy framework outside the ETS which examines the steps that could be taken over the longer term to address biological emissions through partnership with Government and the broader agricultural industry. This framework could: build on Crown-industry GHG initiatives underway, such as the research and development being undertaken by the Pastoral Greenhouse Gas Research Consortium (PGgRc); and leverage the activities in the nutrient management space which have a co-benefit for climate change; and look at additional areas of co-investment. This approach provides time and flexibility for the Government, New Zealand's dairy industry and broader agricultural sector to work together to develop an appropriate framework to deal with agricultural emissions.

1.4 This submission responds to those questions in the consultation document which are relevant to dairy farmers. This submission is to be considered in conjunction with DairyNZ's submission on stage one of the ETS review. We look forward to working with government to advance discussions on the ETS and the broader domestic climate change policy framework for agricultural emissions.

2. BUSINESS RESPONSES TO THE ETS

2.1 **Question 9: Do you consider the future cost of emissions in your business planning?**

2.2 At present dairy farmers do not account for emissions related costs in their business planning but do face indirect costs under the ETS via their farm's energy and transport costs. Dairy farmers may be more likely to factor in the cost of emissions in their business planning if changes to the scheme meant a significant change to their operational cost, for example f biological emissions were included in the scheme and/or dairy processors' ETS emissions liability was to increase substantially in future as a result of the transitional measures being phased out.

2.3 **Question 10: What would improve your ability to take into account the future cost of emissions in your business planning?**

2.4 Currently, because biological emissions aren't included in the ETS, dairy farmers are unable to accurately take into account potential future costs of emissions. DairyNZ believes a way to provide certainty over these costs in the longer term is in the development of a comprehensive long term economy wide climate change plan which factors in the steps which can be undertaken by individuals, businesses and sectors at a regional and national level to address New Zealand's GHG emissions would assist businesses factor in the future costs of emissions. This plan would need to incorporate and build on other economic and environmental drivers New Zealand is striving to achieve such as the Business Growth Agenda and the National Policy Statement for Freshwater Management.

2.5 We envision the plan would include agriculture and would be informed by the work the agricultural industry has undertaken in partnership with Government to develop a long term domestic policy framework to address biological emissions.

2.6 An important component of this framework which would assist dairy farmers account for the future costs of emissions is providing them with the tools to address their farms emissions. This involves implementing an on-farm measurement, providing dairy farmers with mitigations to address biological emissions and having trained and educated advisors available to help guide famers in making business decisions. Any plan to add costs or start to bring biological emissions also needs to prepare the sector with clear information and the right tools to support their business decisions.

2.7 If the dairy industry and broader agricultural sector had a pathway outlining the steps jointly undertaken with Government to address biological emissions over the longer term and had established a framework to enable this transition then the dairy industry would be able to factor in the future costs of emissions into its business planning.

3. ADRESSING BARRIERS TO THE UPTAKE OF LOW EMISSIONS TECHNOLOGIES

3.1 **Question 26: Are there any barriers or market failures that will prevent efficient uptake of opportunities and technologies for reducing emissions?**

3.2 At present there a limited mitigations to address biological emissions. This is why DairyNZ jointly funds the research being undertaken by the PGgRc into finding a mitigation technology or option to address biological emissions, alongside the Government and other industry organisations.

3.3 DairyNZ is mindful of what happened when DCD, a nitrogen inhibitor which mitigated on farm nitrous oxide emissions, was used on dairy farms. The product was withdrawn after a residue was detected in milk from the product, despite the limit posing not threat to human health. We want to ensure that if and when the technologies being developed by the PGgRc come to market that adequate steps are undertaken to ensure a clear pathway to market including protocols around trade in products developed using such technologies to manage the real or perceived reputational risks the products could pose to the dairy industry and broader agricultural sector.

DairyNZ believes infrastructure should be set up to lend additional support to the research and development being undertaken in New Zealand and overseas and to create a framework to test new mitigation technologies and options, help enable market and consumer acceptance and implement and incentivise adoption on-farm.

3.4 **Question 27: If, so is there a role for the Government in addressing these barriers or market failures and how should it do this?**

3.5 DairyNZ believes one of the fundamental components of a framework to address biological emissions would involve setting up infrastructure to lend additional support to the research and development being undertaken in New Zealand and overseas and to create a framework to test new mitigation technologies and options, help enable market and consumer acceptance and implement and incentivise adoption on-farm. The different parties could work collaboratively to explore the activities which could be undertaken over the next five to 10 years to address biological emissions over the longer term.

3.6 This could include:

- Establishing an on farm measurement framework which has careful regard for its effect on farm systems, competitiveness and other environmental outcomes such as water quality;
- Implementing processes to ensure the national inventory can account for new mitigations options and technologies as they emerge;
- Fast-tracking the Animal Compounds and Veterinary Medicines Act (ACVM) registration and Codex processes to bring new products to market and ensure trade is not disrupted;
- Undertake case studies of farms in different catchments looking at the mitigations undertaken to meet their nutrient limits and the effect on nitrous oxide and methane emissions;
- Identify and promote the adoption of good on farm management practices; and
- Examining options to incentivise on-farm adoption of new technologies.

4. ABOUT DAIRYNZ

4.1 DairyNZ is the industry good organisation representing New Zealand's dairy farmers. Funded by a levy on milksolids and through Government investment, our purpose is to secure and enhance the profitability, sustainability and competitiveness of New Zealand dairy farming.

4.2 We deliver value to farmers through leadership, influencing, investing, partnering with other organisations and through our own strategic capability. Our work includes research and development to create practical on-farm tools, leading on-farm adoption of best practice farming, promoting careers in dairying and advocating for farmers with central and regional government. For more information visit www.dairynz.co.nz.

TECHNICAL ANNEXES

ANNEX 1: MITIGATIONS CURRENTLY AVAILABLE

At present there are limited mitigation options available to reduce agricultural nitrous oxide and methane absolute greenhouse gas emissions. The only way to dramatically decrease the dairy industry's absolute emissions is to reduce livestock numbers and limit production growth or through the availability of a suite of breakthrough technologies.

DairyNZ notes there are limitations to the level and timing of GHG reductions that can be achieved through change in farm practice: the GHG reduction potential of the mitigations themselves is constrained and would be dependent on the upskilling of the average dairy farmer. DairyNZ already works with farmers to continuously improve measures for productivity and sustainability outcomes and from this work understands well that achieving significant results on a national scale takes time.

For this reason DairyNZ supports establishing a joint industry- government work programme to look at the steps that can be undertaken over the next five to 10 years to address biological emissions.

Increased use of low nitrogen supplementary feed

A number of supplementary feeds such as maize silage, hay and silage have lower nitrogen content. Their accelerated use could result in a decrease in absolute nitrous oxide emissions, while also reducing emissions intensity. The fall in nitrous oxide emissions from dung and urine is directly proportional to the reduction in nitrogen content in the diet.

Preliminary NZAGRC estimates show increasing low nitrogen supplementary feed could see a reduction in carbon dioxide equivalent emissions by around 2.2 per cent by 2030 relative to 1990. However, DairyNZ believes the minimal decrease in emissions is outweighed by the broader implications it has on New Zealand dairy farm systems.

New Zealand's dairy industry is currently comprised of five farm system types, ranging from a system with very low levels of supplementary feed to a system with high levels of supplementary feed. Incentivising farmers to increase the supplementary feed they give to stock will have cost implications for the farm budget, given supplementary feed is more expensive than pasture. This could have a flow on effect for New Zealand's competitiveness given the dairy industry's current competitive advantage is a low cost pasture based systems. Moreover the higher cost of the supplementary feed means for many farmers this option is uneconomical.

Reductions in total nitrogen fertiliser

A second, related mitigation option is to increase the efficiency in which nitrogen fertiliser is used so that the use per unit area and animal declines. This does not necessarily imply lower pasture production, but would require more careful management of nutrient flows, for example by using more purchased feed and/or the growing of forages with a higher yield per hectare. Nitrogen fertiliser can be a highly cost effective way of producing feed and the appetite for reducing its use if doing so requires changes to on farm practice or upskilling therefore may be limited.

Currently about eight per cent of total CO2 equivalent dairy emissions are estimated to come from nitrogen fertiliser use. Preliminary NZAGRC estimates suggest it could be possible to reduce nitrogen fertiliser inputs by 2030 comparative to 1990 by 1.4 per cent.

In reality reducing the nitrogen fertiliser applied per hectare is very difficult and requires a significant skill level and careful feed budgeting. If the amount of fertiliser applied is underestimated then this could reduce a dairy farm's productivity and ultimately its income.

Improved pasture management in conjunction with improved breeding worth

It is possible to reduce greenhouse gas emissions by improving herd reproductive performance and reducing the number of replacement animals needed on-farm. This would result in fewer non milking cows producing GHGs which would lower emissions on-farm and improve intensity.

Improving reproductive performance requires considerable skill and has been an industry concern for many years. Improving reproductive performance to a significant extent nationwide will be a difficult challenge.

Other mitigation options

For completeness, we highlight are other mitigation options with some GHG reduction potential. DairyNZ however does not consider these to be viable mitigation options at this point in time:
Re-introduction of DCD: While DCD may be reintroduced in the future, there may be significant issues in getting farmers to adopt the inhibitor and getting international markets to accept the technology;

Increased temporary confinement of animals (feed and stand-off pads through to longer term housing): Housed systems and manure management systems have been eliminated as viable mitigation options based on the large investment required to build a housed system.[1] There is also a perverse incentive for farmers to increase production to recover the capital cost invested in building a housed system. This would result in an accelerated increase in GHGs, while also increasing nitrogen leaching.

Expanded opportunity for manure management (biogas generation technologies): Biogas generation technologies are well developed for stand-off pads and house systems, however, they are costly and challenging to implement and run. Flaring any gas collected from a housed system is a much cheaper and more practical option for New Zealand conditions, but even with this approach initial 'back of the envelope' estimates suggest the costs may be prohibitive.

At this point in time very little work has been undertaken to identify other good management practices which can be applied on dairy farms which result in reduced nitrous oxide and methane emissions. This is partially due to the cost of undertaking field trials and partially due to the difficulty in measuring emissions from dairy cattle. Livestock breathalysers have been used in the past during field trials to measure emissions; however they are unreliable and costly. However, this is an area which could be explored in partnership with Government.

[1] The economic and nutrient loss impacts of constructing and running cow housing facilities-a case study of five South Island free stall barns, February 2015, Matt Newman (DairyNZ) and Phil Journeaux (AgFirst Waikato).

ANNEX 2: POSSIBLE FUTURE MITIGATION OPTIONS

New technologies that can reduce methane and nitrous oxide emissions (intensity and absolute) are being developed by the PGgRc and the NZAGRC. Although promising results are being obtained and these solutions have significant potential, it is important to note that the timeframe for commercialisation, market acceptance and on-farm adoption is uncertain.

The technologies under development include:

- Identifying low methane feeds that can help reduce GHG emissions;
- Developing a methane vaccine to inhibit methane production;
- Identifying genetic markers of naturally low methane- emitting sheep and cattle;
- Identify suitable inhibitors against methane generating microbes;
- Developing and extending new and existing technologies and management techniques to reduce nitrous oxide emissions and nitrate leaching; and
- Identify opportunities to increase the carbon content of New Zealand grassland soils.

There is insufficient information to estimate possible emission reductions due to vaccination. Twenty per cent is often quoted but that is the figure being targeted as the minimum reduction needed for technology to be worth developing further. It is also an open question as to whether the effects of an inhibitor and a vaccine are additive. As they are both targeting methanogens it is possible that they are not additive, although the diversity within the rumen microbial population does not rule out the possibility that complementary products could be developed. At a minimum a combined vaccine/inhibitor approach for grazing animals could reduce enteric fermentation emissions from individual animals by 30 per cent.

Widespread adoption of an effective vaccine/inhibitor package, together with low-emitting animals, has the potential to deliver large emissions reductions, but this depends not only on their effectiveness per animal but also adoption rates, commercialisation and market acceptance.

Additional GHG related projects being undertaken

DairyNZ is aware of other greenhouse gas related projects including:

- Interactions between plants and soil microbes to see if any changes in management practice could promote organisms that reduce or bypass environmentally negative outcomes;
- Feeds or feed additives with anti-methanogenic properties (including cereals, lipids, brassicas, tannin-containing plants and garlic) – see Annex 1;
- Biochar to store carbon in soil;
- Methane inhibitor called DSM which has been successfully tested in Switzerland and could be available on-farm in the next five years. However it would need to be tested on New Zealand's pasture based systems to see if it is suitable for New Zealand dairy farms; and
- The Pastoral 21 II project aims to implement new dairy systems integrating proven component concepts to increase profitability from production while reducing the environmental footprint. Analysis of the results has shown there is a positive

relationship between reducing n-leaching and reducing on-farm nitrous oxide emissions;

- Identify opportunities to increase the carbon content of New Zealand grassland soils; and
- A Primary Growth Partnership (PGP) project Managing GHG Emissions is underway, aiming to develop:
    - A network of certified GHG consultants;
    - An accurate and verifiable tool for accounting GHG reductions. This project is still in the early stages; and
    - A framework to support farmers to understanding their GHG emissions and options for GHG mitigation while meeting other farm business objectives.

ANNEX 3: NUTRIENT MANAGEMENT AND GHG EMISSIONS

Research undertaken by DairyNZ, AgResearch along with various international studies show there is a positive relationship between nitrogen leaching and on-farm nitrous oxide emissions. With regional councils developing regulations under the National Policy Statement for Freshwater Management (NPS) to reduce nitrogen leaching in different catchments we can expect to see a reduction in on-farm nitrous oxide emissions.

DairyNZ's current message to all farmers is to focus on adopting best management practices to reduce nitrogen leaching. If dairy farmers adopt improved pasture management, including more targeted use of nitrogen fertiliser and irrigation, and feed stock high quality feed and where possible reduce crude protein intake (e.g. by feeding grains or maize silage) then this is likely to reduce the farm's n-leaching, which in most cases will result in a reduction in nitrous oxide emissions. However, it is important to also look at what happens to the methane emissions when feeding stock maize silage (or anything with lower energy content than pasture) as more feed may be required to provide the animal with the energy required for milk production. This will therefore increase the animal's methane emissions.

If regional councils under the NPS adopt a scenario where a nitrogen cap is introduced which forced dairy farmers to reduce the amount of nitrogen leached per hectare, then farmers may have to consider adopting low input systems or high input barn systems. However, high input systems are costly and some farmers may need to recoup the cost through increasing production which would increase GHG emissions and N-leaching. This is why DairyNZ does not consider that a semi or fully housed system is a viable mitigation to N-losses and GHG reduction, as it may have a perverse effect.

DairyNZ's research farms show that adopting a lower-input/high-efficiency farm system has the potential to reduce n-leaching and n-oxide by a conservative estimate of around 20 per cent across different regions. The "lower-input/high-efficiency" option involves:

- Reduced n-fertiliser use;
- Grow less feed;
- Reduced imported feed;
- Reduced cow numbers;
- If possible using cows of higher genetic merit to utilise the available feed with higher efficiency; and
- Best practice grazing and feed management.

It is important to note that this has so far only been achieved on research farms and is not "current practice". There are some concerns that pasture management may be more difficult with a lower stocking rate. Further work is required to look at the adoptability of the lower-input/high-efficiency principles and what affect this would have on the average farm. It is also important to note that the Farm Managers level of expertise on the research farms may be a lot higher than an 'average dairy farm'.

The variation in farmer uptake of the low input farm system may well be driven by N-leaching regulations. Catchments across the country are at different stages in implementing the NPS. Regions that are at advanced stages like Waikato/Waipa catchment, Rotorua catchment, Horizons, Canterbury and Southland may well see earlier uptake. In Canterbury for example Lincoln University Dairy Farm is in the process of implementing the low stock efficiency principles. This may result in an acceleration of uptake amongst Canterbury farmers.