Your submission to Action for healthy waterways – consultation

Graham Shepherd, BioAgriNomics Ltd (Graham Shepherd)

Personal details removed

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Farm plans - please refer to questions 54-57 on page 80 of the discussion document

Notes

The Regional Councils Farm Environment Plans (FEP’s) are in principle a great non-regulatory tool to help farmers meet regional council environmental requirements without resource consent. In doing this, their soil conservation and land management training of farm consultants and rural professionals and those running FEP Workshops need to incorporate into their standards and management systems options that will effectively reduce the amount of N entering the environment. From a scientific standpoint, there are many farmers who because of their management practices would have a significantly lower environmental footprint than others. It would therefore be quite wrong to tarnish them with the same brush as the high emitters and regulatory authorities need to recognise this and act appropriately. While nitrogen is an essential element to grow pasture, it is rightly identified by regional councils and other environmental bodies as a potential contaminant. It is true that urine from a cow can be a major source of nitrogen leaching. This however needn’t be the case. The cow takes the rap for its N-rich urine but we fail to appreciate why its urine is so high in N. The amount of N in urine is commonly equivalent to 1000 kg N/ha but can be up to 1600 kg/ha. The concentration of N in urine therefore varies significantly and is generally diet related. If the cow eats nitrate/crude protein rich pastures, a type of pasture that is commonly created by our farming practices, the bugs in the rumen are unable to efficiently digest and process the pasture. The nitrate/crude protein level in our pastures are elevated partly because of the high levels of N recommended and applied in the wrong form. Pastures rich in nitrate-N and crude protein and with a low sugar content are difficult for the micro-organisms in an animal’s rumen to break down by fermentation because of the lack of starch and energy (sugars and carbohydrates) in the pasture. The rumen microbes do not have the energy or capacity required to utilize the excess N in the feed and, as a consequence, convert about 80% of it into ammonia. Some of the ammonia is used by the rumen bacteria for their own growth while most is absorbed into the blood stream. The high concentration of ammonia in the blood (a toxic substance) overloads the liver as it attempts to convert it to urea, which is subsequently excreted in the urine, milk and breath. The high concentration of N in the urine markedly increases the amount of N leached into the groundwater and waterways and the amount of nitrous oxide (N2O) emitted into the atmosphere (refer to pg’s 35-36 of the Visual Soil Assessment). As an aside, the high levels of N in the cow’s system is a major reason why empty rates have climbed from typically <5% five decades ago to 15-30% today. The elevation of N levels also comes at an additional high cost to the farmer because it reduces soil carbon levels and suppresses clover and microbial performance, the very things that we need to promote. It is no coincidence that the above issues coincide with the extensive and excessive application of N (and K) on our farms. An estimated 750,000 tonnes of urea (345,000 tonnes N) was applied in 2014 (most of which was applied to dairy farms), an almost 40-fold increase from the 20,000 tonnes applied in 1983. Apart from providing a feed supplement, maize silage is known to halve the amount of N in the urine because of its low crude protein and high soluble carbohydrate and starch content. Cows eating an energy rich, nutrient balanced, species diverse high-quality pasture with non-elevated levels of N will also result in a much lower amount of N in the urine. This highlights the importance of the diet. The problem lies with the high levels of N and crude protein in the pasture and this is one of the issues that FEP’s need to address. We have developed a culture of an over reliance on nitrogen to grow grass. The FEP’s propose in part to help counter the high N levels in the environment by using models such as Overseer which was designed as a feed budget. While this will help, feed budgets need to be linked to those nitrogenous products that are not highly soluble, enable a more efficient uptake and utilization of N, and don’t come with the downsides that some nitrogenous products have. Overseer also needs to be able to recognize the all important microbial factor which unfortunately it is unable to do so in its current form. Crucially, those management practices that also promote the drawdown of the N in the atmosphere need to be addressed and implemented. Specifically, we need to apply management practices that promote rather than suppress the activity of the free-living and associative nitrogen-fixing bacteria and archaea. Regrettably Overseer in its current form is unable to take account of the huge drawdown potential of atmospheric N by soil microbes. While the strategic use of smart forms of nitrogen is appropriate from time to time, the ability to drawdown all the free N in the atmosphere provides a far more cost effective option than the application of soluble nitrogenous products. It also comes with a much lower environmental footprint. Farm management practices that enable this approach need to be addressed at the FEP workshops and ideally implemented in the farm plans. The environment will be the better for it, not to mention the farmers profit margin. In assessing environmental risks on a farm, many of the measures that have been proposed in the past are band-aid’s that attempt to mitigate the symptoms of a high amount of N in the environment. A smart, lower cost way of going with a much lower environmental footprint would be to deal to the cause of the problem. To this end, an eight point plan is outlined in the following link: https://www.stuff.co.nz/business/farming/agribusiness/95826097/soil-scientists-road-map-to-clean-green-future. A FEP would be significantly more effective if this type of approach was implemented. While the spotlight is very much on the amount of N in urine, the reasons for this are not being adequately addressed. Highly soluble forms of nitrogenous fertilisers and their excessive application are a major source of N in the environment. The science is clear and it stands to reason that highly soluble N-rich products readily release N which is then readily leachable into the groundwater, particularly if the root system is limited. Most dairy farms that use a lot of N have a limited and shallow root system. The N creates a lazy plant where the roots don’t have to penetrate too deeply. There are therefore few roots that will intercept and take up the leaching N. The quick release of N from soluble forms of nitrogenous fertilisers has long been recognized by the fertilizer industry and academia and is the major reason why they have funded and developed products such as Agrotain© and DCD (Dicyandiamide). These products treat urea with urease and
a nitrification inhibitor respectively to help reduce the rate of N release from the urea granule, therefore reducing nitrate leaching and nitrous oxide emissions. Unfortunately, the treatment suppresses the very soil microbes needed to produce the enzymes that promote the release of the N we want under natural pathways. The choice is simple; either buy in the high-cost treated forms of N products or activate the low cost natural pathways that are available. If urea is to be used, coating it with a polymer that doesn’t affect the soil microlife, or dissolving it in water along with a humate is a far better way to go. Regrettably politicians and farmers are told that there are limited options available to reduce emissions from farms so the question of including agriculture in an Emissions Trading Scheme (ETS) is put in the ‘too hard basket’ and shelved. Partly because of our agricultural emissions, The Climate Change Performance Index recently rated New Zealand as being ‘poor’, placing it 43rd of 58 countries. The reality is there are many very effective options available but do we have the industrial and political will to address them in FEP’s and other farming forums? Graham Shepherd is a soil scientist and independent farm adviser, Managing director of BioAgriNomics and author of the widely commended Visual Soil Assessment (VSA) method (www.BioAgriNomics.com).

**Clause**

Immediate action to reduce nitrogen loss - please refer to questions 58-64 on page 80 of the discussion document

**Notes**

Just to provide a brief background, I was a research soil scientist with DSIR and a Crown Research Institute for 27 years and in 2004 established my own farm consultancy business. Because I was appalled at the sight of advice given to farmers including nutrient management, I wrote the 2nd Edition of the Visual Soil Assessment (VSA) method as a simple means of assessing the condition of the soil and the performance of the pasture and crop. A detailed resume is given on my web site (www.BioAgriNomics.com). In order to develop an Action Plan for Healthy Waterways, we need to address the root causes of our high emissions of nutrients into our waterways (rivers and lakes). Traditionally we have attempted to implement a plethora of band-aids that have received significant government funding in the past. These band-aids include the development of N-inhibitors and coating urea with Agrotain to slow the release rate of N, the development of the Spikey® machine and NitroStop technology, capping or reducing stock numbers, breeding genetics, the development of anti-methanogenic vaccines, the application of Overseer, riparian plantings, fencing etc. Most if not all of these have had a limited effect. For example, I’m not aware that fencing can remove N & P from surface runoff and groundwater passing beneath the fence. Because our emissions have increased and the state of our waterways have progressively deteriorated over the years, we must ask the question as to how these band-aids have worked for us. Given the state of our rivers and lakes and the fact that they are getting worse, I would suggest these band-aids have had a limited effect. Successful governments have invested hugely in this area, however, given that in pastoral areas 86 per cent of New Zealand rivers exceed guidelines for nitrogen standards and 90 per cent exceed them for phosphorous, the return to the taxpayer has been very poor. To me the band-aids are nothing more than an attempt to try and mitigate the effect of the continued application of excessive amounts of soluble, quick release fertilisers. The notion from Federated Farmers that large amounts of “farming will have to go if the Government’s plan to clean up waterways becomes law” is ridiculous and well illustrates the poor understanding we have in this country about agriculture and what’s causing its high environmental footprint. While nutrients are required by the plant, we by and large do not apply them in the right amount or in the right form. Contrary to a common belief, the nature of NPK differs depending on the form in which they are applied. The form in which a nutrient comes in is critical. We don’t need to as Chris Allen (a spokesperson for Fed Farmers) put it that the implementation of the governments proposals would “take away large amounts sheep and beef farming off the Canterbury plans and a lot of dairy farming would have to go”. I would like to see an Action Plan address the causes of our high environmental footprint. Politicians, regional councils, policy makers etc. are wrongly told that changing farm management practices is both too difficult and too costly. This is not correct and we can in fact turn things around quite quickly, much quicker than a generation that the Environment Minister David Parker is saying. We can also do this at a significantly lower cost than currently thought. The need for change shouldn’t be seen as a long-term challenge that will take a generation to fix. Recommendations We can easily and effectively address the issues and at low cost by: 1. moving away from the application of soluble, quick release fertilisers to less soluble, slow release fertilisers. Apart from the release of a lot of nutrients into the waterways, the quick release fertilisers also create lazy plants with a shallow root system allowing amongst other things the by-pass flow of dissolved nutrients into the groundwater and waterways. A large wetland in Southland with previously no water quality issues was surrounded by 14 neighbouring dry stock farms that applied little in the way of N. Only one dry stock farm now remains; the other 13 have been converted to dairying. Because of the advice given to the dairy farmers, high amounts of N have been applied with the result that the wetland has high levels of eutrophication. With better quality advice, these dairy farms could continue to be high performing units with a much lower environmental footprint. Balance Agri-Nutrients have finally recognised the reality of the quick release fertilisers on the environment and have recently released SurePhos, a slow release fertiliser that they say will be better for the environment and “a game changer”. Compared to most of the smaller fertiliser companies, Balance have been very slow off the mark in this regard. Regardless, Ravensdown need to follow suit and do likewise in the interests of sustainability and the environment. 2. better interpretation of what the plant actually needs rather than meeting a companies sale targets. If some of our fertiliser companies better appreciated this, the question of sustainability would rise above vested interests 3. improving the quality of the pasture eaten by our dairy herds and dry stock so they’re not grazing nitrate-rich, crude protein-rich pastures which the microbes in the rumen struggle to convert to milk, meat and fibre (as described in the Visual Soil Assessment, pg’s 35-37). 4. promote the structure of the soil by artificially aerating compacted ground to promote the density and depth of the root system thereby encouraging the uptake and utilisation of nutrients 5. increasing the residual level of grazed pasture promoting nutrient uptake, dry matter production and root length density - grass grows grass 6. introducing species diverse, energy rich pasture, some with a deep root system encouraging the capture and uptake of nutrients 7. reducing the concentration of N in the urine. It’s the concentration of N in the urine due to the advice given to farmers that is the problem not the urine itself. The advice farmers receive is the reason why the urine is so N rich 8. raising the performance of the clover in the pasture including their ability to become nitrogen fixers rather than nitrogen feeders. This would significantly reduce the amount of mineral N applied 9. encouraging the natural mineralisation pathways of N rather than applying high cost bag N. This can be partly achieved by promoting a good biomass, diversity and activity of soil microbes enabling the mineralisation and supply of nutrients 10. promoting the drawdown of the 78% free N in the atmosphere by promoting the free-living and associative nitrogen-fixing bacteria and archaea in the soil 11. converting the dairy effluent pond into a source of less leachable, less-volatile organically bound forms of plant available N & P by adding a biological activator & adjusting the pH of the pond to 7.4. 12. changing the type of sanitising agents used in the dairy shed to products that are not antagonistic to the biomass and activity of the digestive microbes in the effluent pond 13. encouraging the sequestration (capture and storage) of long-chain stable carbon in the soil by...
implementing grazing and cropping practices that drawdown the carbon in the CO2 in the atmosphere. Sequestering soil C brings huge economic and environmental benefits to the farm. Pastoral agriculture can far exceed the planting of trees in its ability to sequester soil C and we do not need to retire good grazable land to offset all our emissions. Removing all the ‘grandparenting’ activities of those who have been sold the idea that they cannot farm successfully without the application of high rates of nitrogenous fertilisers. A grandparenting entitlement is good for those fertiliser companies selling N but bad for the economic performance of the farm and the environment. The question is, do we have the political and industrial will to make the above changes without the interference of vested interests? One would hope that we at last have a climate for change. None of the above 14 measures are expensive to implement and they should be the first to be addressed when installing an action plan to reduce farming’s high environmental footprint. Regrettably the above measures are by and large not addressed by our regulatory authorities and policy makers. Having a foot in both the scientific and the economic and practical operational aspects of farming, it is very apparent that there are many who do not know what they do not know and our agricultural activities are governed by vested interests. It’s time that the science and our trial work take precedence over unawareness and vested interests. We need to give farmers clear guidelines and the tools to reduce their environmental footprint. Clearly the advice they have received from farm consultants, fertiliser companies and industry funded agricultural scientists in the past has come at a considerable environmental cost.