NZ GRASSLAND ASSOCIATION
Fuelled by Science, Tempered by Experience

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Short Cuts

Impacts of Urea and DCD use on the farm clarified

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The New Zealand Grassland Association takes pride in its strap line – fuelled by science and tempered by experience. Members of the national executive read and consult widely as part of on-going commitment to adding value to members. When members raise questions to do with primary production and grassland systems, we try to respond based on science and experience. Our newsletters contain articles that we hope will be of general interest, as well as articles based on particular issues that are topical.

The latest matter to be causing confusion has appeared in rural media under the general heading that New Zealand farmers are using too much urea and that the problem with DCD is that it is an antibiotic.

Andrew Swallow of Rural News has done an excellent job (19th February) of presenting Dr Arden Andersen's ideas; some of these ideas are not based on science or New Zealand experience.

Dr Andersen has been quoted as saying that 'Too much urea… gives New Zealand about 3-4 times the amount of milk urea nitrogen (MUN) as you'll see in US milk'. USA research indicates that the MUN indicating good conversion of feed protein to milk, with little conversion of excess 'bypass N' into urea in the liver, is 12 to variously 14-17 mgN/dL of milk. The range recorded for the research was 7-25 mgN/dL; average Holstein herds have been recorded at 15.5 mgN/dL and Jersey at 14.1 mgN/dL. In the US herds are generally housed and on mixed rations. Research in New Zealand indicates a range from 5.4 to 26.8 mgN/dL; herds average 9.6- 18.8 mgN/dL throughout the year, the higher figure being associated with spring pasture. The measurements suggest that US and New Zealand herds operate within the same range.

Dr Andersen is also reported as saying that it is 'well known that much urea in New Zealand ends up in the rivers or lakes, whereas efficiency means that all the nutrients are used on the farm'. Once urea is applied to the soil it is rapidly converted to other forms of nitrogen so the concept that 'urea … ends up in rivers…' is misinformed. Fertiliser requirements in New Zealand are calculated based on nutrients being exported off farm and what is required for plant growth, based on soil and herbage tests. Using the tests, farmers can see if they are increasing, maintaining or mining nutrient concentration in the soil. New Zealand's fundamental problem is that most nutrients brought onto the farm are exported in milk and meat; it is extremely difficult to be 100% efficient. However, precision agriculture as well as the cost and benefits of fertiliser use, ensures that farmers are applying what is required for optimising plant growth at the most responsive time of the year. Fertiliser companies, which are co-operatives in New Zealand, are assisting. In the US, fertiliser companies are not generally owned by farmers – and this ownership, plus subsidies, creates different drivers. Of further note is that the OECD reports New Zealand to be one of the most efficient users of nutrients in the countries measured.

'You'll only get nutrition into the milk if the soil nutrition is balanced – which it isn't if we have all these problems with the cow', is another of Dr Andersen's assertions. Pasture growth is affected if nutrients aren't available, and without pasture in New Zealand it is true that milk yields will be down. The effect of cow nutrition is seen far more rapidly in quantity of milk than in nutritional composition of milk. The latter is monitored constantly and New Zealand pasture-based milk has been shown to have a higher ratio of omega 3 to omega 6 fatty acids than standard US milk. As it this ratio that US organic milk suppliers (which are pasture-based in contrast to housed cows on mixed rations) highlight in marketing as being 'more nutritious and better for you', it would seem that New Zealand already has a fundamental advantage in being pasture-based.

Dr Andersen draws a causal relationship between supposed high levels of mastitis and poor cow longevity to supposed imbalances in New Zealand soil and

resulting cow stress. He also points out that New Zealand cows are not even close to producing what US cows do, suggesting that it is imbalance not stress that is causing ill health. This overlooks various facts, including the limiting factor concept – an imbalance results in a limitation and pasture doesn't grow.

Firstly, research from Massey University involving almost 93,000 lactations during 2005/06 and 2008/09 indicates an 11% incidence of clinical mastitis. In contrast, statements from industry websites in the US indicate US prevalence of mastitis is 25%.

Secondly, the US pays on volume, not milk solids, and the average lactation is over 400 days whereas in New Zealand dairy farmers are paid for milk solids and are constrained by seasonal production to a lactation cycle of approximately 300 days (depending on pasture growth and cost of supplementary feed). This means that production has totally different drivers and comparisons between countries are meaningless.

Thirdly, the average life of a US dairy cow is 2.5 lactations before culling. In New Zealand it is 4.8. It would therefore appear that New Zealand is not at any disadvantage in comparisons of stock health and longevity.

With respect to the suggestion that DCD is an antibiotic, confusion is apparent. DCD is the short name for dermcidin, a protein encoded by the DCD gene. Dermcidin is produced in sweat glands and is variously described as antimicrobial or antibiotic because it kills organisms on the skin. In contrast, dicyandiamide, also termed DCD, is applied to pasture where it has a bacteriostatic effect (it is not a nitricide). It is decomposed in the soil via guanyle urea and guanidine to urea, a conventional nitrogen fertilizer. Absorption of large amounts into the body can lead to the formation of methaemoglobin which in sufficient concentrations causes cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). The PAN Pesticide website suggests if DCD is ingested, drink plenty of milk or water. As the DCD that has been measured at very low quantities in milk powder is not an antibiotic, antibiotic resistance will not appear in our children after drinking reconstituted milk powder.

Universities and CRIs have done, and are doing ,a considerable amount of research on the various components that make up 'biological agriculture'. They are called soil science, pasture science, and animal science, as well as ecology and systems research. However, in all the research that has been funded by the tax payer, farmers through levies, rates, co-operatives as well as taxes, and some commercial companies, no 'silver bullet' has been found. The question must be asked why the tax-payer should fund the re-investigation of the components of a particular product or approach when the major benefactor is an individual or commercial company.

Finally, Dr Andersen states that New Zealand is just like other countries in that the research organisations are in the sway of chemical companies for funding and so 'they are extremely biased and aren't going to do things and report things that don't satisfy the agency or company funding that information'. He doesn't appear to know that at least some of New Zealand's major research organisations state in contracts with commercial companies that they retain the right to balance trials, to randomise and replicate treatments, to analyse the data, and to withhold their name if they don't agree with the way that the research results are used commercially.

New Zealand might not be the same as overseas in this, but sweeping statements are easy to make; honourable, trustworthy and professional people and companies exist overseas as well as in New Zealand. In the grassland sector, they are fuelled by science and tempered by experience.

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