Aaron Stafford, who graduated with a doctorate from Massey University in May, discovered that concentrations of cadmium accumulated in chicory and plantain were at least 10 to 20 times higher than ryegrass and white clover.

“Grazing livestock that ingest these plants have a potentially elevated risk of increased cadmium accumulation in their livers and kidneys,” says Aaron.

Cadmium is a naturally occurring metal found in trace levels in water, air and soil. It is found at various levels in phosphate rock, from which phosphate fertiliser is derived. Accumulation of cadmium in agricultural soils, and in pasture, fodder and horticultural crop species is an ongoing management issue for agricultural and horticultural production systems around the world. Long-term dairy farms in some of New Zealand’s most productive farming districts (e.g. Waikato, Bay of Plenty and Taranaki regions) tend to have higher soil cadmium levels than other regions of New Zealand. This is due to their history of intensive farming and phosphorus fertiliser use over many years. The soil cadmium levels are thought to be predominantly a legacy of phosphate applications during the period from 1950’s and 60’s through to the mid 1990’s when fertiliser cadmium concentrations were higher.

“This does not mean that these soils are ‘high-risk’ for plant cadmium uptake and exposure in animal and human diets,” says Aaron. “Many factors influence soil cadmium availability, such as soil pH and organic matter content. As a result, plant cadmium uptake can still be greater in some soils at low ‘background’ soil cadmium concentrations. My work demonstrates that plant species can be a major factor influencing livestock dietary cadmium exposure.”

Aaron did experiments on two long-term dairy farms on contrasting soils in the Waikato and Canterbury regions. One of his main goals was to understand how different forage species accumulate cadmium from the soil. His work also contributed to building up a better data set for researchers to work from in future.

“This information can help us understand what, if any, risk there is to grazing animals,” says Aaron. “There’s been a lot of historical work on cadmium done in New Zealand focused on grass/legume based pasture, but little in the past 20 years when I started doing the work. Forages grown in livestock grazing systems have changed a lot in that time. My research reappraised what we know about cadmium and its variability in the landscape, and factors which control its availability in the soil and exposure to grazing livestock.”

To avoid the risk of cadmium entering the food chain, the sale of offal from ruminant animals older than 30 months is prohibited in New Zealand. “My research raises the question of whether animals that are grazing really high cadmium crops need to be screened out earlier. There would need to be further research to determine how much earlier; however, ‘more work is needed to understand the impact of some of these high cadmium forages and the risk from animal ingestion.’

Aaron says it is important to know the phosphorus-fertiliser application history, cultivation history, and soil type variation of any land that is being managed for farming. “This information will help farmers work out where cadmium might be in the landscape and how to manage it.”

In the future he would also like to see research on how to breed varieties of chicory and plantain that accumulate lower cadmium concentrations.

Aaron’s research was funded by the Fertiliser Association of New Zealand. His supervisors were Professor Chris Anderson, Professor Mike Hedley and Dr Paramsothy Jeyakumar.
Clover is renowned for its nitrogen-fixing properties, and provides a nutritional benefit to grazing animals. Four-leafed or not, clover is the jackpot for growing healthy grazing livestock.

In the study, a team of researchers applied potassium fertiliser to five hill country trial sites in the Hawkes Bay with low levels of potassium in the soil. By applying varying amounts to each site they were able to gauge the effects on total pasture production. Jeff pulled the results together in a research report, which has been published in the New Zealand Journal of Agricultural Research.

“At our trials sites, we were able to increase the amount of clover we grew by applying potassium,” says Jeff. “The more potassium we applied the more clover we grew.

“What was surprising was that this didn’t result in more total pasture production – we grew more clover but not more grass. Whereas when we didn’t apply any potassium it resulted in more grass growing.”

Most hill soils in New Zealand have adequate potassium levels, Jeff explains. “Sheep most commonly graze hill country pastures and sheep are more efficient at cycling potassium than cattle. The potassium is still there because the soils haven’t been weathered and there’s a lot of potassium that’s yet to be used in the soil.”

Adding potassium to the soil works best on soil that contains low levels of potassium, with a reasonable amount of existing clover.

The method won’t always result in more clover: “You need to have reasonable rainfall to grow clover. If you haven’t got clover in your hill country soil, mainly because it’s too dry, you won’t get any payback by applying potassium.”

The report ‘Potassium requirements of pastures on North Island east coast hill country in New Zealand’ is available at www.tandfonline.com.
OCP supplies around 70% of the total phosphate used in New Zealand fertiliser manufacturing. There is controversy around the rock, as it comes from Western Sahara, which is seeking self-governance.

The delegation met with key stakeholders in the primary sector. They discussed the actions PhosBoucraa is taking to benefit the local community, through training of farmers on better crop management, camel breeding and improved water efficiency. They also explained how they are providing health and surgery services and educational facilities.

The Fertiliser Association continues to assess and monitor the long-standing territorial dispute in Western Sahara. “We recognise that the situation poses complex legal and ethical questions,” says Vera Power, Chief Executive of the Fertiliser Association of New Zealand. “However, we are confident that domestic and international law currently permits the import of phosphate rock sourced from Western Sahara. Stopping trade is unlikely to resolve the conflict – indeed, economic deprivation would likely create less stability and increased tensions in the region.”

PhosBoucraa is the largest employer in Western Sahara and more than two thirds of the 2,300 employees are local to the area. “It’s important that the people of Western Sahara benefit from the trade. Both Ravensdown and Ballance are emphatic about that. Refusing to buy OCP’s phosphate would affect the livelihoods of many local families in Western Sahara. “We would very much like to see a timely solution to the territorial dispute in Western Sahara, but it is only the UN Security Council that can find a lasting resolution to the political situation. We do not believe there is sufficient justification for pre-emptive action by the industry, such as terminating our contracts for supply. The benefits to both New Zealand’s agricultural sector and the local inhabitants of Western Sahara are too great.”
The 2018 Budget announcement in May saw the Government allocating $5m of operating funding to Overseer Limited over the next four years – a move that is welcomed by the Fertiliser Association. Meanwhile, Overseer will soon be launching game-changing software to make it even easier for farmers and their advisors to make informed decisions about how they run their farms more sustainably and efficiently.

The software, due to be launched in June, has been created following extensive consultation with industry, and will be easier and more intuitive to use than its predecessor.

“The changes bring the tool up-to-date with the changing needs of the Primary Industry,” says Alastair Taylor, Overseer Limited’s new Business Development Manager. “By placing the farm account at the centre of the on-line system we believe we have made some significant improvements to the way data is created and stored; in addition to a complete overhaul of the user interface. This is going to reduce duplication, improve modelling consistency, and make it easier to track a long-term view of a farm.”

Overseer has been working closely with stakeholders to ensure they’re informed about the changes. This includes working with the Fertiliser Association of New Zealand and the Nutrient Management Adviser Certification Programme to ensure certified advisers find it as easy as possible to use the new software. New and training advisors will be able to step quickly into the improved system.

“Although the tool will be much easier to use, it will still require trained professionals to deliver quality farm analyses and, particularly, good scenario analysis. This is where the software really begins to deliver value for the sector; as a vehicle for innovation.”

Alastair joined Overseer in April from his role leading the Farm Sustainability Services team at Ballance Agri-Nutrients. He will be working with Overseer’s users and stakeholders to help the transition to the new software.

“Fundamentally, we know that the overwhelming majority of farmers believe they have a real responsibility to look after the environment. I see it as my role to ensure that Overseer continues to play a major supporting role in the sustainability and success of the primary industries.”

“Farmers are increasingly expected to understand their farm’s impacts, both for greenhouse gas emissions and nutrient flows – and in many cases, to reduce them,” Alastair says. “Overseer provides the science to support good decisions while also delivering the information they need to farm within environmental limits.”

With the new tool, comes a new level of user support, and Overseer has also welcomed Carly Sluys as Customer Services Specialist. “Carly is our resident Overseer expert. She has a wealth of knowledge from her time as Environmental Data Analyst at Beef + Lamb and she’ll be poised at the end of our online helpdesk to provide customer support,” Alastair says.

You can access the Overseer online helpdesk through the MyOverseer portal.

For more information or to arrange a demonstration for your team, contact Alastair Taylor, Business Development Manager at Overseer Ltd at ataylor@overseer.org.nz or 021 857627.