



**the answer to farming**  
**WITH NITROGEN FERTILISER RESTRICTIONS**

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## regulatory requirements

### NATIONAL ENVIRONMENTAL STANDARDS FOR FRESHWATER - FARMING UNDER 190 KG PER HECTARE NITROGEN CAP

On the 5th of August 2020 the New Zealand Government announced their new essential freshwater regulatory requirement which includes a cap on the application of synthetic nitrogen fertiliser to pastoral land.

Under this new legislation and in general terms all pastoral farmers will need to keep synthetic nitrogen fertiliser use below 190 kg N/ha/year from 1st July 2021.

Donaghys N-Boost® can reduce farmer's nitrogen fertiliser use to be within the new regulations whilst continuing to grow the same amount of dry matter without compromising pasture quality.

## cost of nitrogen cap to farmer?

This table compares an average Canterbury dairy farm that has been applying 240 KG/N ha (pre N- cap regulations) against 3 possible scenarios

Current situation  
Farming using  
240 kg of N  
per hectare before  
N cap

scenario 1.  
Farming under the  
190 kg of  
N/ha cap

## using N-Boost

scenario 2.  
Farming under the  
190 kg of N/ha cap  
Spread urea 135kg  
N/ha p.a. plus  
N-Boost® System  
for 55 kg of  
N/ha p.a.

scenario 3.  
Farming under the  
190 kg of N/ha cap  
Full use of the  
N-Boost® System  
and approximately  
halve urea use of  
250kg of N/ha

NITROGEN APPLICATION PER HA	240		190		190		128	
	per ha	Total farm	per ha	Total farm	per ha	Total farm	per ha	Total farm
<b>CALCULATED RESULTS due to nitrogen application</b>								
Total Dry Matter grown	2,880	671,040	2,280	531,240	2,940	685,020	3,072	715,776
Total milk solids produced	225	52,425	178	41,503	230	53,517	240	55,920
Total milk solids revenue earned	\$1,463	\$340,763	\$1,158	\$269,770	\$1,493	\$347,862	\$1,560	\$363,480
Cost of solid N	\$339	\$79,017	\$268	\$62,555	\$268	\$62,555	\$181	\$42,143
Cost of solid N application	\$94.50	\$22,019	\$67.50	\$15,728	\$27.00	\$6,291	\$0.00	\$0
Cost of N-Boost®	\$0.00	\$0	\$0.00	\$0	\$40.77	\$8,154	\$94.29	\$18,858
Cost of N-Boost® application	\$0.00	\$0	\$0.00	\$0	\$63.00	\$12,600	\$147.00	\$29,400
Total costs including application	\$434	\$101,036	\$336	\$78,283	\$399	\$89,600	\$422	\$90,401
<b>CONTRIBUTION TO PROFIT FROM NITROGEN USE</b>	<b>\$1,029</b>	<b>\$239,727</b>	<b>\$822</b>	<b>\$191,487</b>	<b>\$1,108</b>	<b>\$258,261</b>	<b>\$1,172</b>	<b>\$273,079</b>
<b>SUMMARY</b>	Under the new freshwater standards, farmers will need to reduce their nitrogen use to 190kg of N/ha or apply for a consent to apply more than this		This scenario shows that <b>\$48,239</b> less annual profit will result from the reduction in nitrogen use		Using solid urea plus partial use of the N-Boost® System can allow you to meet the new standards and increase annual profit by <b>\$18,534</b>		By fully adopting the N-Boost® System you can reduce your nitrogen by approximately half, meet the new standards and reduce nitrogen leaching up to 15%** whilst increasing annual profit by <b>\$33,352</b>	

#### ASSUMPTIONS

Farm Size 233 Hectares - NZ Dairy Statistics 2018/19 (LIC & Dairy NZ), Pre N cap annual N use 240 KG N/ha, Pasture N Response to solid N 12 KG DM/KG N, Pasture N Response to N-Boost® 24 KG DM/KG N, 1 KG milk solids per 12.8 KG DM\*, Revenue \$6.50 per KG milk solids, Urea price \$650.00 / tonne (delivered), Urea rate ~80 kg/ha (Scenarios 1-2) & 40 kg/ha Scenario 3, N-Boost® rate 3 Litres / hectare, N-Boost® cost \$4.53 / Litre (scenario 2) and \$4.49 / Litre (Scenario 3), Solid application cost \$13.50 / hectare /application, N-Boost® application cost \$21.00 / hectare /application.\* 12.8 KG DM required per 1 KG milk solids for a 450 KG LWT FxJ dairy cow producing 420 kgMS/yr (average Canterbury cow - NZ Dairy Statistics 2018/19), assuming 85% feed utilisation and 11.0 MJ ME/KG DM- reference: Dairy NZ lactating cows web page

\*\* Modelling of a typical 233ha Canterbury dairy farm, using the Overseer® nutrient budget software, indicated up to a 15% reduction in nitrogen leaching from using the N-Boost® System at 40kg/ha of urea compared to 80kg/ha of urea only, without compromising pasture production.

(No allowance for any reduction in nitrous oxide emissions has been made in these examples)

Disclaimer: The above tables are examples based on Donaghys scientific pasture trials and the resulting average nitrogen responses. Actual results may vary from farm to farm.



## the N-Boost® System on pasture

### 1. Dissolve urea

At a rate of 40kg/ha in 200L of water using a Donaghy's supplied mixing station

### 2. Add N-Boost®

At 3L/ha

### 3. Spray on pasture

200L/ha of the total spray mix, either self applied or using a contractor

Grow the same amount of dry matter with half the usual amount of nitrogen.\*

The N-Boost® and dissolved urea solution is then sprayed onto pasture with a conventional boom sprayer or boom jet.

\* Based on trials comparing the N-Boost® System to use of 80kg of urea

## how does N-Boost® work?

The foliar application of dissolved urea results in the nitrogen being in a plant available form (ammonium), improving the efficiency of nitrogen uptake. Studies show that the majority of nitrogen can be taken up into the leaf within the first 12 hours after application.

Scientific studies at Lincoln University found that N-Boost® stimulates mitochondria and chloroplasts which are key cell components of the plant responsible for energy storage and production.



**Adenine compounds** that are produced during the manufacturing process of N-Boost®, together with amino acids are the active ingredients responsible for increased nutrient uptake and increased movement of nutrients (especially nitrogen) within plants.

- N-Boost® increases chlorophyll activity in the plant
- N-Boost® stimulates plant energy
- N-Boost® increases plant nutrient uptake
  - Allowing the plant to produce more carbohydrates
  - Allowing more amino acids to convert into protein
  - Increased protein production = Increased growth

The microorganisms utilised in the production of N-Boost® are commonly found in soils and are all on the GRAS (Generally Recognised As Safe) list of ACVM. After production has been completed, the final packaged N-Boost® product contains no live microorganisms and is a non-DG product.

## benefits

MEET THE NEW 190KG/HA  
NITROGEN CAP

MAINTAIN PROFITABILITY

MAINTAIN STOCK UNITS  
AND PRODUCTION

DECREASE ENVIRONMENTAL  
IMPACT

### meet the new 190kg/ha nitrogen cap

Donaghys N-Boost® can reduce farmer's nitrogen fertiliser use to be within the new regulations whilst continuing to grow the same amount of dry matter without compromising pasture quality.

### maintain profitability

Modelling partial use of the N-Boost® System (refer scenario 2) allows farmers to maintain profitability when compared to pre N cap conditions. Full use of the N-Boost® System can potentially allow farmers to increase their profitability (refer scenario 3)

### maintain stock units and production

Trials show that the N-Boost® System doubles the nitrogen response of pasture compared to 40kg/ha of urea alone allowing farmers to maintain production whilst reducing nitrogen use.

Metabolisable energy (ME) and other feed quality indicators of pasture grown are maintained using the N-Boost® System. By using less nitrogen, clover levels in pasture can be increased leading to subsequent increased potential in atmospheric nitrogen fixation.

### decrease environmental impact

Using the N-Boost® System allows you to reduce your nitrogen application, which is shown to reduce nitrogen leaching by up to 15%\*. A reduction in nitrogen can result in a decrease in nitrous oxide emissions.

\* Modelling of a typical 160ha Canterbury dairy farm, using the Overseer® nutrient budget software, indicated up to a 15% reduction in nitrogen leaching from using the N-Boost® System at 40kg/ha of urea compared to 80kg/ha of urea only, without compromising pasture production.

## application of N-Boost®

To apply the N-Boost® System onto pasture, 40kg/ha of urea is dissolved in water with 3L/ha of N-Boost® and typically sprayed at a total spray mix volume of 200L/ha.

### DISSOLVED UREA

Urea is easily dissolved in water in an N-Boost® Mixing Station (which can be supplied by Donaghys) or by agitating in a spray tank.

### APPLICATION

The N-Boost® and dissolved urea solution is then foliar sprayed onto pasture with a conventional boom sprayer or by boom jet. This can be self applied or using a contractor. Refer to label for usage instructions.



5,000, 10,000 & 25,000 Litre mixing stations available (tank, pipes, pump and fittings).

**For details and conditions, please contact Donaghys.**

### N-BOOST® AS PART OF A SPRAYING SYSTEM

The N-Boost® System can be incorporated with existing spray applications allowing the farmer to apply multiple products at once, saving time and money.

### broadleaf pasture herbicides

N-Boost® has also been tank mixed and found to be compatible with commonly used broadleaf pasture (phenoxy) herbicides e.g. Donaghys 2-4D Ester, Donaghys 2-4D Amine and Donaghys Flumetsulam.

### gibberellic acid

Donaghys GibbSTART MAX can be mixed with N-Boost® and applied strategically during shoulder periods to stimulate extra pasture production.

### facial eczema and rust control

Donaghys Liquid Mycotak can be added to the spray mix to provide control of the causal organism of facial eczema.

Liquid Mycotak offers up to six weeks protection against facial eczema.

Donaghys Myco-RF can be used with the N-Boost® System for the control of Rust and Fusarium in pasture resulting in cleaner, healthier and more palatable pasture.

## proven

### PROVEN IN NEW ZEALAND AND INTERNATIONALLY

PATENTED IN  
**5**  
COUNTRIES

**1**  
INTERNATIONAL  
PUBLICATION

N-Boost® has been peer reviewed and published in the Journal of Plant Nutrition.

OVER  
**10**  
YEARS ON  
NZ FARMS

**5**  
PEER  
REVIEWS

The pasture trial data reports of N-Boost® have been peer reviewed by five independent parties.

**53**  
EXTERNAL  
ORGANISATIONS

**370**  
TRIALS

Since 2008, there have been 370 pasture and crop trials conducted by 53 independent universities and organisations.

## publications

The scientific N-Boost® pasture trials have been peer reviewed both in New Zealand and internationally including trial design, statistical analysis, product performance and an overall meta-analysis of the data.

### AsureQuality Peer Review

This report by AsureQuality reviews the New Zealand field trials on pasture conducted by Donaghys to evaluate pasture responses to the application of N-Boost® in association with urea. It considers the design and execution of the field trials as well as the analysis and reporting of results. *“Overall, the adopted trial design and statistical analyses are scientifically robust.”*

ASUREQUALITY REVIEW; AUG 2009

### Fertiliser Quality Council Peer Review Report

This Fertiliser Quality Council peer review is a report of the Expert Panel on the pasture trial programme conducted by Donaghys to support their claims regarding the agronomic performance of N-Boost®. *“This current review concludes that the overall trial program has been designed and conducted in a scientifically credible manner.”*

FERTILISER QUALITY COUNCIL REPORT; SEP 2012

### Fertiliser and Lime Research Centre

A paper entitled *“Nitrogen Response Effect of LessN®: A Meta-Analysis”* was presented at the Fertiliser and Lime Research Centre (FLRC) Conference at Massey University on 12-14 February 2013.

JENKINS, T.A. AND RANDHAWA, P.S. (2013). NITROGEN RESPONSE OF LESSN: A META-ANALYSIS. IN: ACCURATE AND EFFICIENT USE OF NUTRIENTS ON FARMS. (EDS L.D. CURRIE AND C L. CHRISTENSEN).

### Journal of Plant Nutrition, USA:

#### How well do fertilizer enhancers work?

N-Boost® biostimulant sprayed with dissolved urea increased pasture nitrogen response by an equivalent of 18.0 kg N/ha compared to urea alone in nitrogen responsive and label conditions trials. This was similar to a manufacturer claim that the product increases nitrogen response by an equivalent of 18.4 kg N/ha.

### VSN New Zealand Ltd

*“I would conclude that on average there was less than a 3% difference between the two treatments [LessN® System vs. 80kg urea per hectare].”*

DR DAVID BAIRD; OCT 2012.

*“The average addition[al] kg of N over 40 kg required to give the same response as LessN is 39 kg with a 95% interval of (35-44) kg.”*

DR DAVID BAIRD; OCT 2012

### Saville Statistical Consulting Ltd

*“In general terms, the LessN40 treatment yielded twice the DM response per kg of applied nitrogen as did the two treatments with the same rate of applied nitrogen (40 kg urea/ha), and was equivalent to the two treatments with twice the rate applied urea (80 kg/ha).”*

DAVE SAVILLE; OCT 2012

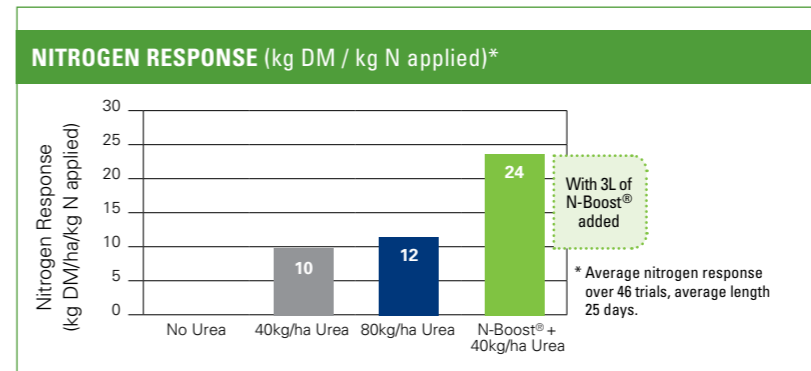
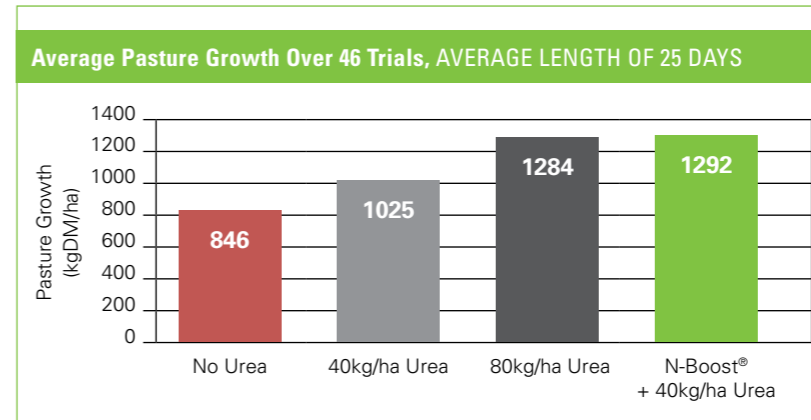


## pasture trials

**67 trials nationwide** have been conducted on a mixture of dryland and irrigated clover based pasture, making it the largest nitrogen response study on pasture in New Zealand since 1981.

**The trial periods** ranged from 15 to 187 days with the average length of most trials being 25 days.

**Over 100,000 individual pasture** measurements were taken. Of the trials conducted, seven trials did not show a nitrogen response to urea application, seven were not conducted in accordance with Donaghys recommendations (i.e. off-label) and another seven did not include a treatment with 40kg/ha of urea.

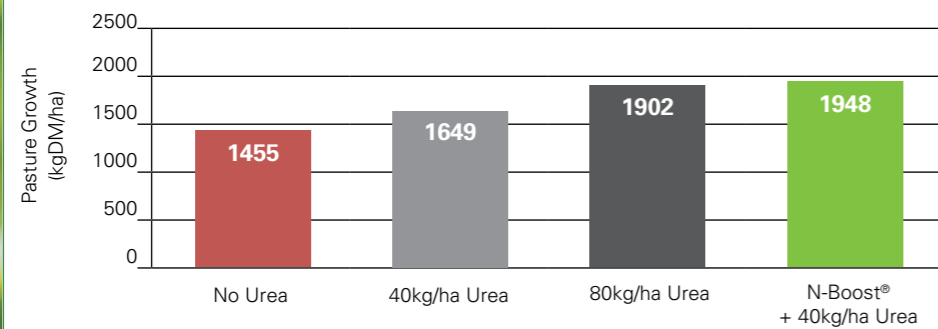




## extended pasture trials

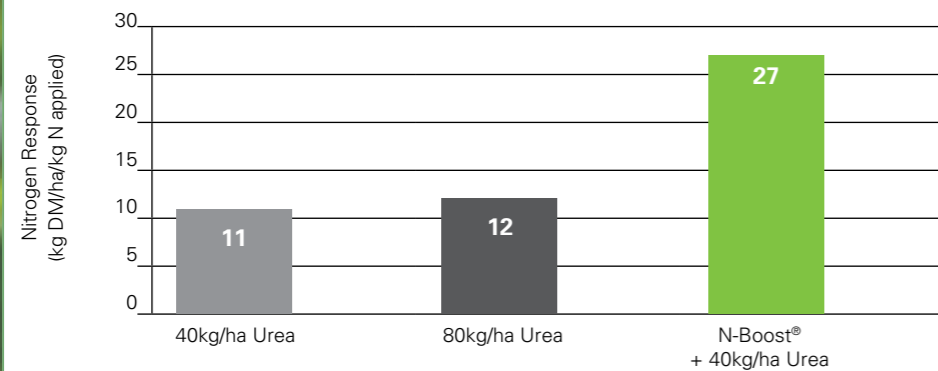
Nine extended trials were conducted past one grazing round (average of 49 days) to assess the residual effect of N-Boost®. Five of these trials were independent and four were in-house.

**Average Pasture Growth Over 9 Trials, AVERAGE LENGTH OF 49 DAYS**



Extended trials proved that the residual effect of the N-Boost® System is similar to an application of solid urea at 80kg/ha as an average of 1948kg of DM was grown with the N-Boost® System compared to 1902kg of DM with 80kg/ha urea.

**Average Nitrogen Response Over 9 Trials, AVERAGE LENGTH OF 49 DAYS**

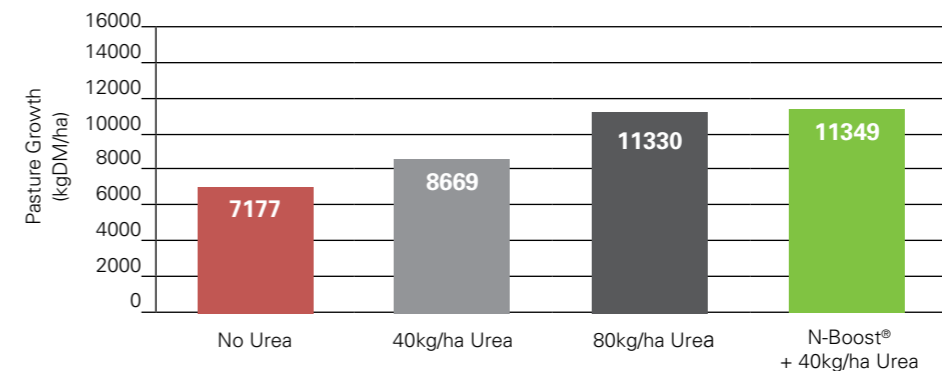


Over the average of these trials, 27kg/DM per kg of Nitrogen was grown with the N-Boost® System, compared with 12kg/DM with 80kg/ha of urea and 11kg/DM with 40kg/ha urea applied.

## ONE TRIAL WAS ALSO CONDUCTED THROUGHOUT AN ENTIRE MILKING SEASON (SEVEN GRAZING ROTATIONS)

Treatments were reapplied before grazing three and grazing six. Using 120kgs less urea, the N-Boost® treatment grew similar amounts of pasture to the 80kg spread urea treatment.

**Total Pasture Growth Over One Trial, TOTAL LENGTH OF 187 DAYS**



### variability of nitrogen fertiliser response

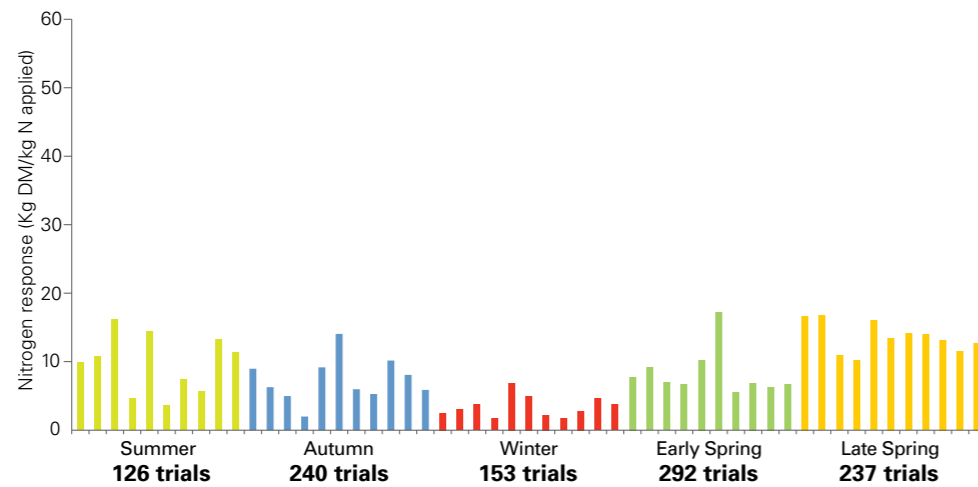
**Applying urea alone** will have variable results on pasture response due to external factors such as soil temperature, moisture and existing soil nitrogen.

**Using the N-Boost® System** will also have variable results on pasture response but trial results show that the N-Boost® System will still double the pasture response to 40kg of urea per hectare.

\* Nitrogen Fertiliser Trial Database: A Valuable Resource. Climatic Factors and First Cut Response to Nitrogen Application. In: Nutrient management in a rapidly changing world. (Eds L.D. Currie & C.L. Lindsay), pp. 191-204. Fertiliser and Lime Research Centre, Massey University, Palmerston North, NZ.

#### The Regional Variability Of Nitrogen Response On Pasture Using Urea Alone

DATA OBTAINED FROM RAJENDRAM ET AL. 2009\*

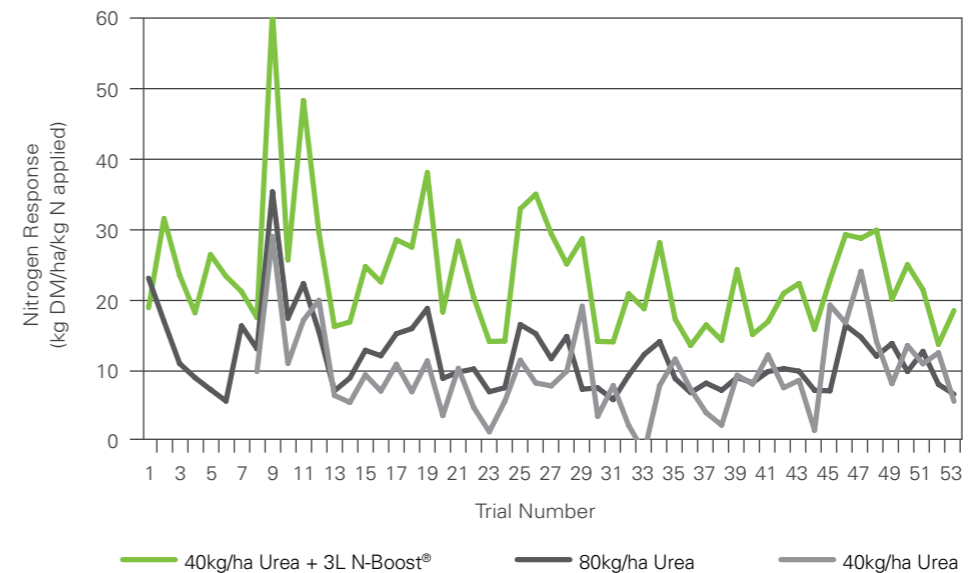


Each bar represents from left: Northland/Auckland, Waikato, Bay of Plenty, Taranaki, Lower North Island, East Coast North Island, Northern South Island, Canterbury, West Coast South Island, Lower South Island and Central Otago.

### UREA AND THE N-BOOST® SYSTEM HAVE SIMILAR VARIABILITY

Using the N-Boost® System will also have variable results on pasture response but trial results show that the N-Boost® System will still double the pasture response to 40kg of urea per hectare.

#### Nitrogen Response Of 3L N-Boost® + 40Kg/Ha Urea COMPARED TO 40KG/HA UREA ALONE AND 80KG/HA UREA ALONE



N-Boost® should only be used when a nitrogen response can be expected. Soil temperatures must be 10°C or above. Ensure sufficient pasture cover for optimum foliar uptake (1400-1600kg DM/ha). For best results apply the N-Boost® System 3-5 days after grazing. Sufficient soil moisture content is required for pasture to respond. Avoid application in very hot or windy conditions or within 6 hours of impending heavy rain.

## cropping with N-Boost®

### application on crops

In cropping situations, 3-6L/ha of N-Boost® is applied as a foliar application with water, sprayed at an appropriate water volume (50-200L/ha). The N-Boost® solution is then applied to the target crop at specific growth stages in addition to standard fertiliser applications.

To save costs, N-Boost® is recommended to be used at the same time as a sprayed on herbicide, fungicide or insecticide application (with or without the addition of foliar nitrogen).

Conditions and timing for spraying N-Boost® on to crops vary depending on individual crop types.

**Contact your local Donaghys Territory Manager for further information.**



**Georgia USA grower Mr R Dowdy** broke the world record for soybean yield with 190.23 bushels per acre (12.8 tonnes/ha) of soybeans.

This surpasses his previous record of 171 bushels per acre (11.5 tonnes/ha) in 2016.

N-Boost® was among the key crop inputs credited with helping this renowned USA grower set a new world record for soybean yield in the 2019 Georgia Soybean Production Contest, and was part of a core soybean nutrition programme designed to help soybeans reach their full genetic potential.

**N-BOOST HELPED GROWER SET NEW WORLD RECORD FOR SOYBEAN YIELD**

**9.8%**  
CROP YIELD INCREASE

In trials, the overall average yield increase was 9.8% for N-Boost® treated crops, compared to untreated crops.

### increase crop yields

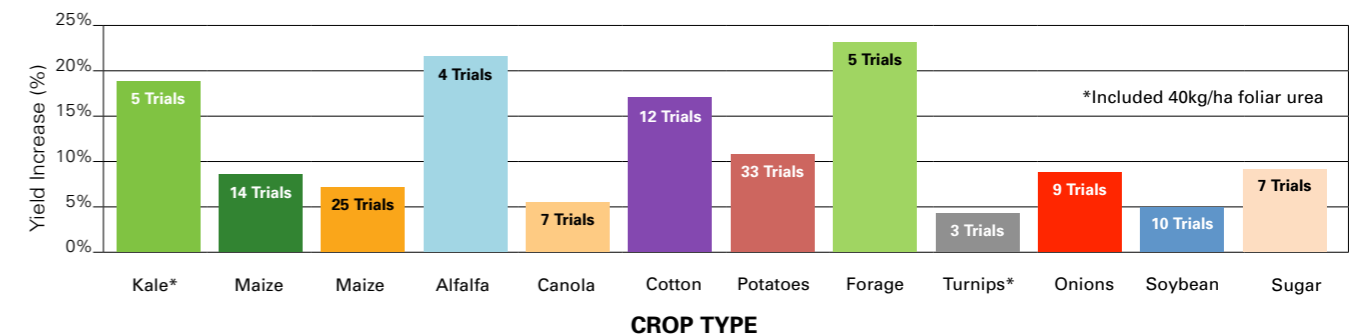
#### Crop Trials

N-Boost® is recognised internationally where it is largely used in broadacre and intensive cropping situations.

N-Boost® has been proven to provide commercially viable yield increases on a range of significant broadacre and intensive vegetable crops.

Over 250 replicated trials have been conducted on 25 different crop types. In trials designed to quantify yield improvement, the overall average yield increase for the N-Boost® treated crops was 9.8% compared to the untreated crops.

The Effect of N-Boost® on Selected Crops Trialled in New Zealand and Overseas



During many of these trials, N-Boost® has been tank mixed with many common agrichemicals without any incompatibility issues. It is recommended that a small area be trialled for compatibility if unsure.

Donaghys N-Boost® is the original scientifically proven and trusted Donaghys LessN® with the same ingredients and method of application.

## about us

**Established in 1876**, proudly NZ owned and still manufacturing in Dunedin, Donaghys has been supplying the rural sector for over 140 years. Just as farming practices have changed over the years so has Donaghys.

**Donaghys has** a comprehensive range of quality and innovative products across animal health, dairy shed supplies and crop protection.

**With knowledgeable and experienced** territory managers, backed by our technical veterinarians and scientific team, Donaghys takes pride in what we offer, and stand behind the products we supply.

FOR MORE INFORMATION ABOUT N-BOOST® VISIT

[www.donaghys.com/n-boost](http://www.donaghys.com/n-boost)

or call **0800 942 006**

to be directed to your local territory manager.



**Farm owner Don Schimanski** and manager Ian McDonald milk a herd of 750 cows on their Otorohanga farm in the Waikato. The property is 185 hectares, with 175 of that being effective, they run a system 5 operation with an average of 2,200 milk solids produced per hectare.

*"I've been using N-Boost for 10 years now, it's halved N use"*

*"We've kept the cow numbers up and production has gone up"*

*"It's cheaper, so it's brought our cost per hectare down"*

DON SCHIMANSKI AND IAN MCDONALD



**DONAGHYS**  
PERFORMANCE FIRST