

Net Zero Plan: WOA Releases First Lupin Sustainability Study in response to Federal Government Agriculture and Land Sector Plan

Highlights:

- *Following the Australian Government's release of the Net Zero Plan, WOA is proud to release its Sustainability Review on lupin proteins*
- *WOA believes this to be an appropriate response to the need identified by the government for farmland on the West Coast that currently grows wheat and canola*
- *Studies show that lupins have the lowest carbon intensity of any crop grown in the wheat belt, significantly reducing carbon emissions through the sequestration of nitrogen*
- *Lupins can play a key role in reducing greenhouse gas emissions in the Australian agricultural industry*
- *WOA's strategy of commercialising its Lupin Protein Isolate not only supports low-emission farming, but also creates an entirely new source of highly nutritious and functional protein for human diets*

Wide Open Agriculture Ltd (ASX: WOA) ("WOA" or the "Company") is pleased to share the results of its Sustainability Study into the cultivating and processing of Lupin Protein Isolate.

The Study shows that the Food industry contributes one third of global greenhouse gas emissions, with approximately 40% of this coming from the production of fertiliser from fossil fuels.

Lupins, in contrast, sequester biological nitrogen into the soil, making it available for future crops and reducing the need for fertiliser application. Studies found that incorporating lupins into a two (2) year cropping rotation decreased greenhouse gas emissions in wheat production by 56% on a per hectare basis.

Lupins have a critical role to play in ensuring Australian producers remain global leaders in low-emission food and fibre production. And with WOA's patented technology and deep expertise in lupin processing, lupins can now be turned into high quality protein and fibre products for the human food and beverage industry.

The information in this report supports Global food manufacturers to adopt better sourcing patterns and incorporate new, lower emission ingredients into their recipes. WOA's Lupin Protein Isolate fits this profile and the sales pipeline continues to develop.

WOA will continue to progress its research into the environmental benefits of lupins and lupin protein, and how they can contribute to a Net Zero Plan for Australia.

The Board has authorised and approved this announcement per the Company's published continuous disclosure policy.

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About Wide Open Agriculture Ltd

Wide Open Agriculture Ltd (ASX: WOA) is a publicly listed ingredient company pioneering the development of next-generation plant protein solutions for the global food and beverage industry. Leveraging proprietary intellectual property, WOA produces a portfolio of high-quality lupin-based plant proteins and fibres designed to enhance the functionality, taste, and nutritional profile of food and beverage products.

The Company's lupin-based protein isolates offer exceptional versatility across a wide range of applications, including plant-based dairy alternatives, meat substitutes, baked goods, and health-focused products. Recognised for their clean taste, high performance, and broad functionality, lupin protein isolates are emerging as an exciting new ingredient in the evolving plant-based protein market.

www.wideopenagriculture.com.au

Forward Looking Statements

Statements contained in this release, particularly those regarding possible or assumed future performance, revenue, production levels or rates, prices or potential growth of WOA are, or may be, forward looking statements. Such statements relate to future events and expectations and as such, involve known and unknown risks and uncertainties. Actual results and developments may differ materially from those expressed or implied by these forward-looking statements depending on a variety of factors. The past performance of WOA is no guarantee of future performance. No guidance is provided on future pricing or capacity to fill any future orders.

None of WOA's directors, officers, employees, agents or contractors makes any representation or warranty (either express or implied) as to the accuracy or likelihood of fulfilment of any forward looking statement, or any events or results expressed or implied in any forward looking statement, except to the extent required by law. You are cautioned not to place undue reliance on any forward looking statement. Any forward looking statements in this announcement reflect views held only as at the date of this announcement.



SUSTAINABILITY REVIEW

Carbon Impact of Lupin Cultivation & Lupin Protein Isolates (LPIs)

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Reviewed by: Andrew D. Moore, Life Cycle Logic

ASX: WOA | **FRA:** 2WOA



INTRODUCTION

Wide Open Agriculture manufactures and sells Lupin Protein Isolates to customers in Latin America, Europe and Australia and is actively pursuing new customers in Asia (including China) and North America

This presentation highlights current scientific evidence that explore the carbon impacts of lupin cultivation and isolate production

WOA is aiming to deliver a robust, verified carbon footprint for Lupin Protein

This research supports Global food and drink companies who are seeking low-carbon ingredients to support their sustainable sourcing policies and emissions targets¹



FOOD SYSTEMS CREATE **ONE-THIRD** OF GLOBAL GREENHOUSE GAS EMISSIONS^{2,3}

(16bn tonnes of CO₂ equivalent per year)



2. Tubiello, Francesco N, Cynthia Rosenzweig, Giulia Conchedda, et al. 2021. 'Greenhouse Gas Emissions from Food Systems: Building the Evidence Base'. *Environmental Research Letters* 16 (6): 065007. <https://doi.org/10.1088/1748-9326/ac018e>.

3. Food and Agriculture Organization of the United Nations. 2024. 'FAOSTAT Emissions Database: Greenhouse Gas Emissions from Agrifood Systems'. FAO. <http://www.fao.org/faostat/en/#data/GT>.

PRIORITY SOLUTION – ADOPTION OF NEW PROTEINS



- In 2024, the World Bank published “Recipe for a Livable Planet” which examined 26 of the food, agriculture and forests sector's most promising emissions mitigation interventions⁴



- The World Bank analysis **ranked a shift toward alternative proteins second for climate mitigation potential**⁴
- **The savings were calculated to be up to 6 billion tonnes CO₂ equivalent per year**⁴
- This amount of carbon is approximately six times the equivalent of eliminating air travel worldwide⁵

4. Sutton, William R., Alexander Lotsch, and Ashesh Prasann. 2024. *Recipe for a Livable Planet: Achieving Net Zero Emissions in the Agrifood System*. Agriculture and Food Series. World Bank. <https://doi.org/10.1596/41466>.

5. Lee, D. S., Fahey, D. W., Skowron, A., Allen, M. R., et al. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric Environment*, 244, 117834. <https://doi.org/10.1016/j.atmosenv.2020.117834>

LUPINS: A NEW, PLANT PROTEIN

Lupins can have the lowest carbon footprint of all grains & oilseeds grown in the Wheatbelt of Western Australia⁶

Carbon Intensity

Seed/grain/pulse in dryland, Western Wheatbelt, Western Australia at farm ⁶	kg CO2e/kg seed/grain/pulse ⁶
Lupin seed	0.15
Barley grain	0.29
Wheat grain	0.34
Oat grain	0.40
Canola seed	0.62

SYNTHETIC FERTILISERS & GREENHOUSE GAS EMISSIONS

- Synthetic nitrogen fertilisers (including urea & liquid nitrogen) are manufactured through the energy intensive, Haber-Bosch process⁷
- The most common way of producing granular urea is to convert natural gas from its main constituent, methane⁸
- **Synthetic fertilisers were found to contribute up to 40% of total greenhouse emissions on a West Australian farm located in the mid-western Wheatbelt⁹**



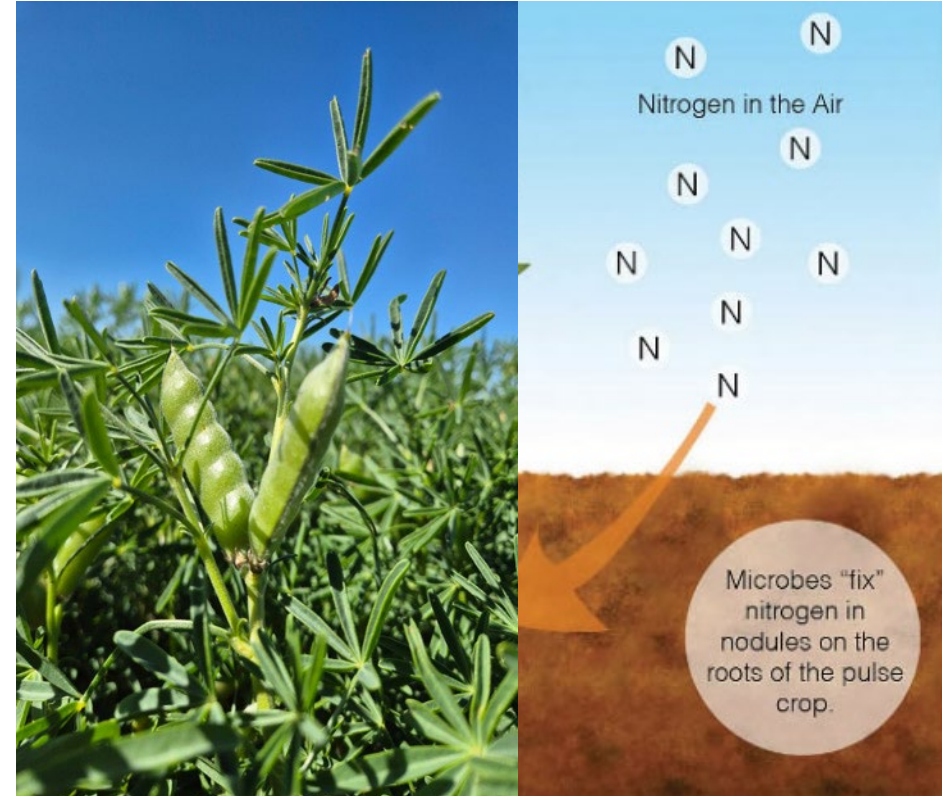
7. Juangsa, Firman Bagja, Adrian Rizqi Irfhamna, and Muhammad Aziz. 2021. 'Production of Ammonia as Potential Hydrogen Carrier: Review on Thermochemical and Electrochemical Processes'. *International Journal of Hydrogen Energy* 46 (27): 14455–77. <https://doi.org/10.1016/j.ijhydene.2021.01.214>.

8. NeuRizer Ltd. 2025. 'About Urea'. <https://neurizer.com.au/library/about-urea> cited on 2 September 2025

9. Cited from CBH Group, Wide Open Agriculture, and DPIRD. 2022. Calculating Carbon Emissions in WA's Grain Industry. https://web-prd.dpird.wa.gov.au/siteassets/documents/agriculture/carbon-neutral-grain-pilot-report_0.pdf.

LUPINS 'FIX' NITROGEN INTO THE SOIL

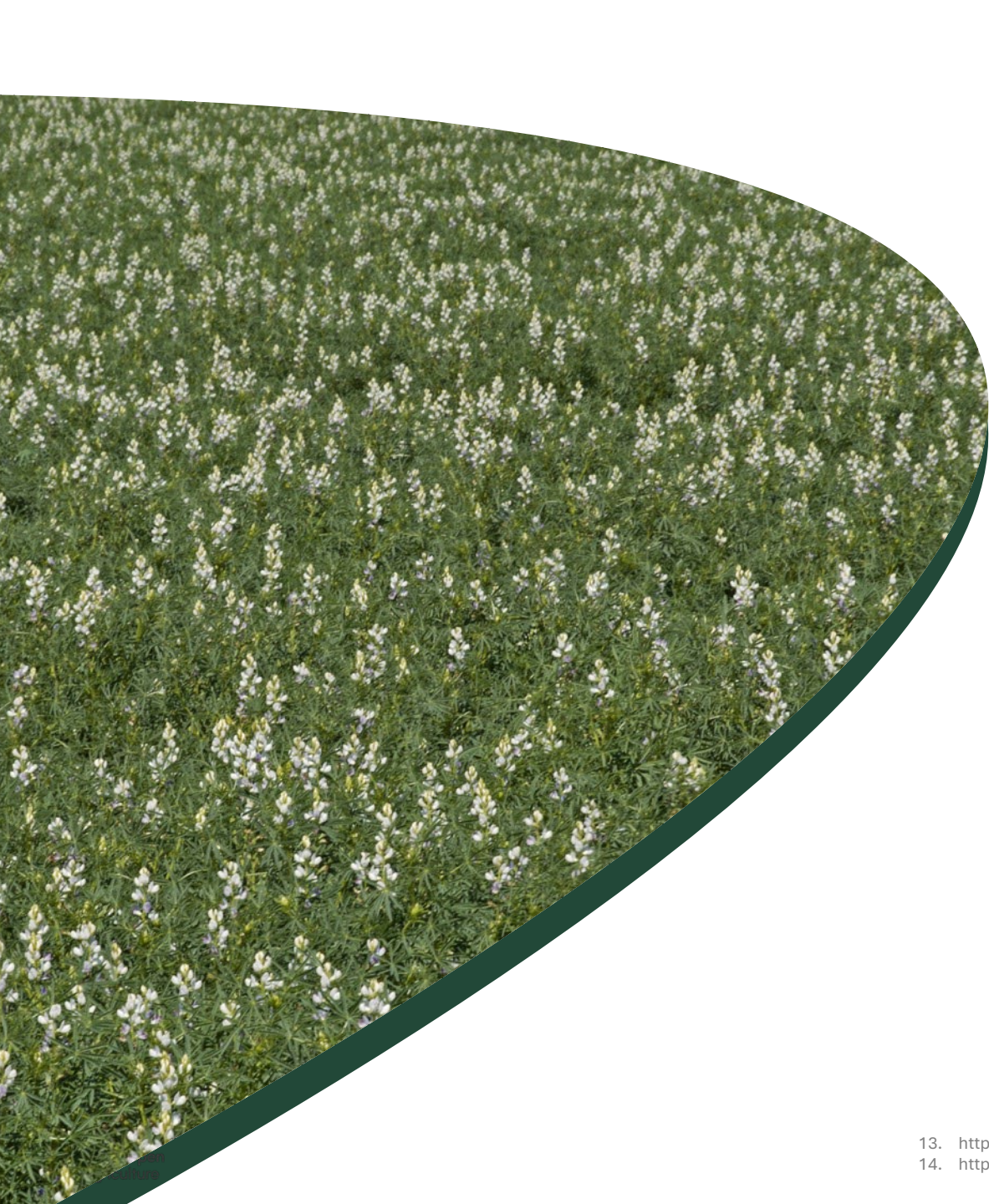
- Lupins require specific root nodule bacteria (rhizobia) to fix nitrogen (N) – to create biological nitrogen¹⁰
- Incorporating a grain legume (lupins) in a two-year cropping rotation **decreased greenhouse gas emissions from wheat production by 56% on a per hectare basis, and 35% on a per tonne of wheat basis, primarily by lowering nitrogen fertilizer inputs**¹¹
- Biological nitrogen has been shown to reduce carbon emission intensity by **9% to 23% in the first year of cereals**, and by **11 to 16% in the second year of cereals**¹²



10. GRDC. 2017. *Tips and Tactics: Legumes and Nitrogen Fixation*. Grains Research and Development Corporation. <https://grdc.com.au/resources-and-publications/all-publications/factsheets/2017/06/tips-and-tactics-legumes-and-nitrogen-fixation>.

11. Barton et al. 2014 Does growing grain legumes or applying lime cost effectively lower greenhouse gas emissions from wheat production in a semi-arid climate? *Journal of Cleaner Production* 83: 194-203

12. d'Abbadie C et al. (2024) Should crop sequences in Western Australia include more lupins? *Crop & Pasture Science* 75, CP23110. doi:10.1071/CP23110



LUPINS, NITROGEN & FOOD SECURITY

- More than 90% of urea fertiliser (~4 million tonnes p.a.) is imported into Australia¹³
- Supply & pricing of nitrogen fertilisers remain volatile & fragile and have been impacted by Russia's invasion of the Ukraine and natural gas pricing¹³
- Domestic fertiliser prices rose by 100% in 2007/08 due to a global price uplift¹⁴
- Reducing reliance on synthetic nitrogen sources, through growing lupins, may offer West Australian farmers with a hedge against price spikes in global synthetic fertiliser prices

13. <https://www.rabobank.com.au/media-releases/2025/supply-fragility-creating-volatility-in-urea-market-rabobank-report> cited on 8 May 2025

14. <https://www.accc.gov.au/system/files/ACCC%20examination%20of%20fertiliser%20prices.pdf> cited on 8 May 2025



CARBON INTENSITY OF MANUFACTURING LUPIN PROTEIN ISOLATES

- WOA sources lupins grown in Western Australia and produces the Lupin Protein Isolate in Germany
- A life-cycle assessment study identified a global warming impact of **4.6 kg CO₂equivalent per kg of Lupin Protein Isolate**¹⁵
- The study assumed production in Netherlands and **applied mass allocation of co-products in the Life Cycle Assessment**¹⁵

SUMMARY

- Wide Open Agriculture is **committed to conducting further research to provide a more accurate carbon footprint of Lupin Protein Isolate** and has a long-term goal of developing an Environmental Product Declaration
- Lupins support **lower carbon emission farming and offer benefits to following years of rotations with cereals (barley, oats and wheat) in Western Australia's Wheatbelt**
- Manufacturing lupin protein isolate under specific conditions has been found to produce up to **4.6kg of CO₂ equivalent per kg of protein isolate**
- WOA's lupin protein isolates create **new demand channels** for lupins into the **global food and ingredient sector**





THANK YOU

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2. Tubiello, Francesco N, Cynthia Rosenzweig, Giulia Conchedda, et al. 2021. 'Greenhouse Gas Emissions from Food Systems: Building the Evidence Base'. *Environmental Research Letters* 16 (6): 065007. <https://doi.org/10.1088/1748-9326/ac018e>.
3. Food and Agriculture Organization of the United Nations. 2024. 'FAOSTAT Emissions Database: Greenhouse Gas Emissions from Agrifood Systems'. FAO. <http://www.fao.org/faostat/en/#data/GT>.
4. Sutton, William R., Alexander Lotsch, and Ashesh Prasann. 2024. *Recipe for a Livable Planet: Achieving Net Zero Emissions in the Agrifood System*. Agriculture and Food Series. World Bank. <https://doi.org/10.1596/41466>.
5. Lee, D. S., Fahey, D. W., Skowron, A., Allen, M. R., et al. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric Environment*, 244, 117834. <https://doi.org/10.1016/j.atmosenv.2020.117834>
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8. NeuRizer Ltd. 2025. 'About Urea'. <https://neurizer.com.au/library/about-urea> cited on 2 September 2025
9. Cited from https://www.agric.wa.gov.au/livestock-animals/carbon-calculators-western-australian-example-farms?page=0%2C3#smartpaging_toc_p3_s0_h3 on 2 September 2025
10. GRDC. 2017. *Tips and Tactics: Legumes and Nitrogen Fixation*. Grains Research and Development Corporation. <https://grdc.com.au/resources-and-publications/all-publications/factsheets/2017/06/tips-and-tactics-legumes-and-nitrogen-fixation>.
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