

**ASX Announcement**

24 March 2025

**WIDE OPEN AGRICULTURE RELEASES PRESENTATION ON THE  
HEALTH BENEFITS OF LUPIN PROTEIN**

Wide Open Agriculture Ltd (ASX:WOA) (“WOA or “the Company”) has today announced the release of a new presentation outlining the significant health benefits of lupin protein across a broad range of medical issues afflicting the global population.

Lupin protein has been shown to improve outcomes for a range of medical issues such as:

1. Cardiovascular Disease (CVD): The World Health Organisation (WHO) estimates 17.9 million people die from CVD each year
2. Hypertension (High Blood Pressure): WHO estimates that globally 1.28 billion people have high blood pressure
3. Diabetes: Approximately 830 million people are living with diabetes globally.

In addition, lupins also have a range of other health benefits across muscle growth and repair, slowing down macular degeneration and providing fertility and pregnancy benefits for mothers.

This presentation will form the basis of discussions with food and beverage companies globally about the advantages of using lupin protein, and in helping craft messages to consumers to support the consumption of lupins.

Yaxi Zhan, Chair of WOA said, “We’ve conducted an extensive review of available research over the last 12 months, which shows that lupins and lupin protein represents a high quality plant protein alternative that helps address the largest health risks faced by the global population today. This will provide strong support for our sales and communication efforts going forward, both with food companies and with consumers.”

The potential health benefits of Lupin Protein detailed in the attached presentation are listed following:

- **Contains higher levels of Essential Amino Acids vs other than other key plant protein sources**
- **Improving cardio-metabolic health**
- **Lowering cholesterol**
- **Lowering blood pressure**



- **May assist in managing diabetes**
- **May delay the development of age related macular degeneration**
- **Aid muscle recovery and repair, and muscle growth**
- **May offer fertility and pregnancy benefits**
- **Positively impacts the gut biome**
- **May assist in fighting breast cancer.**

The relevant scientific studies for these health benefits are included in the references list in the attached presentation.

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

**For investors, media or other enquiries, please contact:**

**Yaxi Zhan** Non-executive Chairperson, Wide Open Agriculture Ltd

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### **About Wide Open Agriculture Ltd**

Wide Open Agriculture (WOA) is an ASX-listed ingredient company focusing on the next generation of plant protein ingredients for food and drink manufacturers globally. Using its unique Intellectual Property (IP), WOA manufactures a range of plant proteins and fibres that create better food and drink products for consumers. The Company's flagship product, Buntine Protein<sup>®</sup>, is a novel plant-based protein derived from lupins. Manufactured under a globally protected patent, Buntine Protein<sup>®</sup> is a versatile ingredient that creates products across multiple categories, including plant-based dairy, meats, baked goods, and health foods. Buntine Protein<sup>®</sup> is gaining a reputation as a clean-tasting, versatile, high-performing plant protein. WOA is listed on the Australian Securities Exchange (ASX: WOA).

[www.wideopenagriculture.com.au](http://www.wideopenagriculture.com.au)

### **Forward Looking Statements**

Statements contained in this release, particularly those regarding possible or assumed future performance, revenue, costs, dividends, 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



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statements depending on a variety of factors. The past performance of WOA is no guarantee of future performance.

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.



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## Appendix 1

### Studies:

| Health Indicator                                     | Lupin constituent | Evidence                   | Reference  |
|--|-------------------|----------------------------|--|
| Hypotensive activity                                 | Lupin protein     | Rat feeding study          | Pilvi TK, et al (2006) Lupin protein attenuates the development of hypertension and normalises the vascular function of NaCl-loaded Goto-Kakizaki rats. J Physiol Pharmacol. 57(2):167-76.   |
| Hypocholesterolemic activity                         | Lupin protein     | Dietary intervention study | Bähr et al.(2013) Lupin protein positively affects plasma LDL cholesterol and LDL:HDL cholesterol ratio in hypercholesterolemic adults after four weeks of supplementation: a randomized, controlled crossover study. Nutrition Journal 2013, 12:107 |
| Hypocholesterolemic activity                         | Lupin protein     | Dietary intervention study | Bahr M, et al. (2015) Consuming a mixed diet enriched with lupin protein beneficially affects plasma lipids in hypercholesterolemic subjects: A randomized controlled trial. Clinical Nutrition 34: 7–14   |
| Hypocholesterolemic activity & plasma lipid lowering | Lupin protein     | Dietary intervention study | Weisse K, et al. (2010) Lupin protein compared to casein lowers the LDL cholesterol:HDL cholesterol-ratio of hypercholesterolemic adults. European Journal of Nutrition 49: 65–71  |
| Atherosclerosis progression                          | Lupin protein     | Mouse feeding study        | Weisse K et al (2009) Lupin protein isolate and cysteine-supplemented casein reduce calcification of atherosclerotic lesions in apoE-deficient mice. British Journal of Nutrition (2010), 103, 180–188   |
| Hypotensive activity & plasma lipid lowering         | Lupin protein     | Dietary intervention study | Nowicka G, et al. (2006) Lupin proteins in the treatment of hypercholesterolemia. Atherosclerosis Supplements 7: 477-477   |
| Metabolic Syndrome                                   | Lupin protein     | Dietary intervention study | Naruszewicz M et al (2001) Effect of Lupin Protein (Lupinus albus) on Cardiovascular Risk Factors in Smokers with Mild Hypercholesterolemia. Abstract 4055, Volume 114, Number suppl_18  |



|                              |               |                            |  |
|------------------------------|---------------|----------------------------|--|
| Metabolic Syndrome           | Lupin protein | Dietary intervention study | Mirmiran P et al (2017) Dietary L-Arginine Intakes and the Risk of Metabolic Syndrome: A 6-Year Follow-Up in Tehran Lipid and Glucose Study. <i>Prev. Nutr. Food Sci.</i> 2017;22(4):263-270   |
| Plasma lipid lowering        | Lupin protein | Rat feeding study          | Spielmann et al., (2007) Dietary protein lowers triglyceride concentrations in liver and plasma in rats by reducing hepatic gene expression of sterol regulatory element-binding protein-1c. <i>Ann. Nutr.Metab.</i> 51:387-392                              |
| Hypocholesterolemic activity | Lupin protein | Human study                | Sirtori C et al (2011) Hypocholesterolaemic effects of lupin protein and pea protein/fibre combinations in moderately hypercholesterolaemic individuals. <i>British Journal of Nutrition</i> (2012), 107, 1176–1183.   |
| Metabolic Syndrome           | Lupin protein | Human study                | Pavanello C et al (2017) Effects of a lupin protein concentrate on lipids, blood pressure and insulin resistance in moderately dyslipidaemic patients: a randomised controlled trial. <i>Journal of Functional Foods</i> , 1 October 2017.                   |
| Plasma lipid lowering        | Lupin protein | Rat feeding study          | Sirtori C et al (2004) Proteins of White Lupin Seed, a Naturally Isoflavone-Poor Legume, Reduce Cholesterolemia in Rats and Increase LDL Receptor Activity in HepG2 Cells1. 0022-3166/04 © 2004 American Society for Nutritional Sciences                    |
| Atherosclerosis progression  | Lupin protein | Rabbit feeding study       | Marchesi, M et al. (2008) Hypolipidemic and anti-atherosclerotic effects of lupin proteins in a rabbit model. <i>Brit J Nutr.</i> 100(4):707-10  |
| Hypocholesterolemic activity | Lupin protein | Rat feeding study          | Parolini C et al (2012) Cholesterol-lowering effect of dietary <i>Lupinus angustifolius</i> proteins in adult rats through regulation of genes involved in cholesterol homeostasis. <i>Food Chemistry</i> Volume 132, Issue 3, 1 June 2012, Pages 1475-1479. |
| Hypocholesterolemic activity | Lupin protein | Hamster feeding study      | Fontanari, G et al (2011) Cholesterol-lowering effect of whole lupin ( <i>Lupinus albus</i> ) seed and its protein isolate. <i>Food Chemistry</i> 132 (2012) 1521-1526   |
| Insulin pathways             | Lupin protein | Rat feeding study          | Soto-Luns I et al (2020) Lupin protein isolate improves insulin sensitivity and  |



|  |               |                             |   |
|--|---------------|-----------------------------|---|
|  |               |                             | steatohepatitis in vivo and modulates the expression of the Fasn, Gys2, and Gsk3b genes. Food Sci Nutr. 2021;9:2549–2560.   |
| Insulin pathways                           | Lupin protein | ex vivo and in vitro system | Santana SM et al (2018) Narrow-leaved lupin ( <i>Lupinus angustifolius</i> L.) seed $\beta$ -conglutins reverse the induced insulin resistance in pancreatic cells. Food Funct. 2018 Oct 17;9(10):5176-5188. doi: 10.1039/c8fo01164h  |
| Insulin pathways                           | Lupin protein | ex vivo and in vitro system | Lima-Cabello E et al (2016) Narrow-leaved lupin $\beta$ -conglutins modulate the insulin signalling pathway as potential type 2 diabetes treatment and inflammatory related disease amelioration. mnf-journal.com   |
| <b>Other</b>                               |               |                             |   |
| Cancer treatment                           | Lupin protein | Ex vivo                     | Escudero-Feliu J et al (2023) Narrow Leafed Lupin ( <i>Lupinus angustifolius</i> L.) $\beta$ -Conglutin Seed Proteins as a New Natural Cytotoxic Agents against Breast Cancer Cells. Nutrients 2023, 15, 523. <a href="https://doi.org/10.3390/nu15030523">https://doi.org/10.3390/nu15030523</a> |
| Eye Health                                 | Lupin protein | Review                      | Fryirs C, et al (2008) Luteins in lupins – an eye for health. In: Palta J A., Berger JD (Eds.): Proceedings of the 12th International lupin conference. CSIRO Plant Industry, Wembley, Western Australia  |
| Pregnancy                                  | L-Arginine    | Review                      | The role of L-Arginine in the prevention and treatment of pre-eclampsia: A systematic review of randomised trials T. Dorniak-Wall, <a href="#">Rosalie Grivell</a> , Gustaaf Dekker, W Hague, Jodie Dodd  |
| Pregnancy                                  | Glutamine     | Human study                 | Glutamine: Role in the Fetus and Low-birthweight Infant<br><a href="#">Josef Neu</a><br>Neoreviews (2000) 1 (11): e215–e221.  |
| <b>Y-conglutin specific</b>                |               |                             |   |
| Reduced blood glucose and insulin response | Y-conglutin   | Rat feeding study           | Magni, C et al. (2004). Conglutin $\gamma$ , a lupin seed protein, binds insulin in vitro and reduces plasma glucose levels of hyperglycemic rats. J. Nutr. Biochem. 15:646.  |
|  | Y-conglutin   | Rat feeding study           | Terruzzi, I (2001) Insulin-mimetic action of Conglutin $\gamma$ , a lupin protein, in mouse   |



|  |              |                |  |
|--|--------------|----------------|--|
|  |              |                | myoblast. Nutr Metab Cardio-vasc Dis. 21:197-205   |
|  | Y -conglutin | In vitro study | Tapadia M et al (2021) Antidiabetic effects and mechanisms of action of $\gamma$ -conglutin from lupin seeds. Journal of Functional Foods 87 (2021) 104786 |







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# Lupin Protein Health Benefits

Backed by Nature, Powered  
by Science





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# LUPIN

## HEALTH BENEFITS

Lupins have been shown to have health benefits across some of the most significant health challenges facing the global population, as well as numerous other benefits



### Blood pressure

An estimated 1.28 billion adults are believed to have high blood pressure globally (hypertension)<sup>2</sup>

***Lupin consumption has been shown to reduce blood pressure***



### Heart health

Cardiovascular disease kills approximately 17.9 million people per year<sup>1</sup>

***Lupins can help reduce cholesterol***



### Diabetes

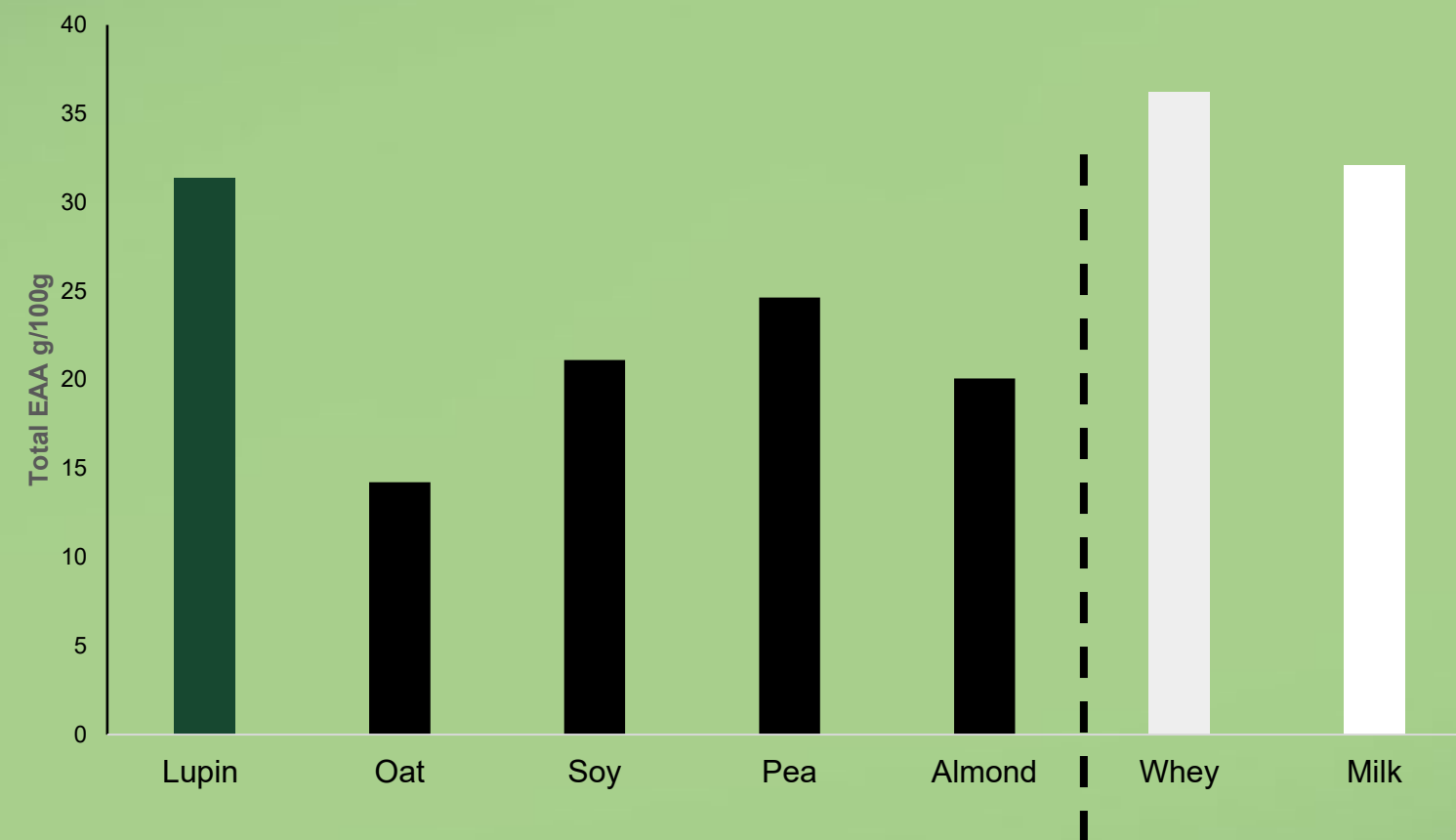
Around 830 million people around the world have diabetes<sup>3</sup>

***Lupins have been shown to play a role in managing blood glucose***

1. [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))
2. <https://www.who.int/news-room/fact-sheets/detail/hypertension>
3. [https://www.who.int/health-topics/diabetes#tab=tab\\_1](https://www.who.int/health-topics/diabetes#tab=tab_1)

Lupins have higher levels of Essential Amino Acids (EAAs)  
than other key plant proteins

Essential Amino Acid Profile



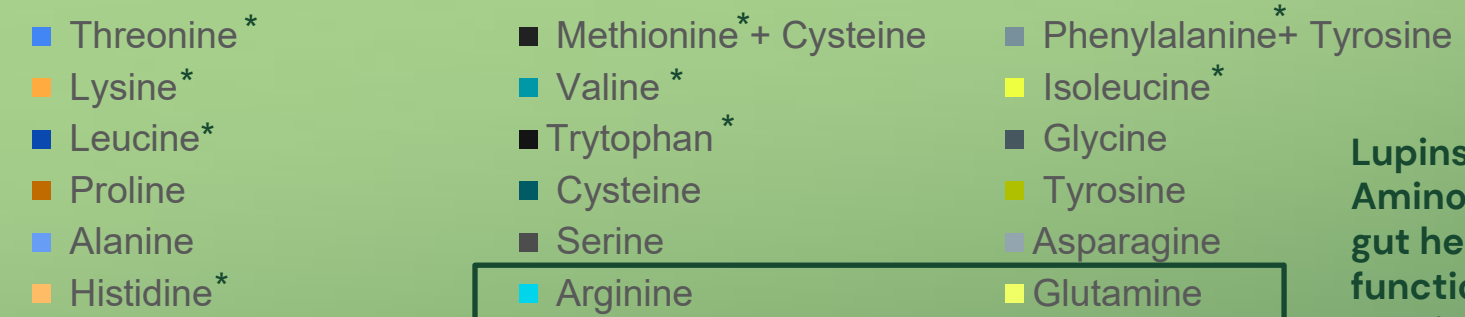
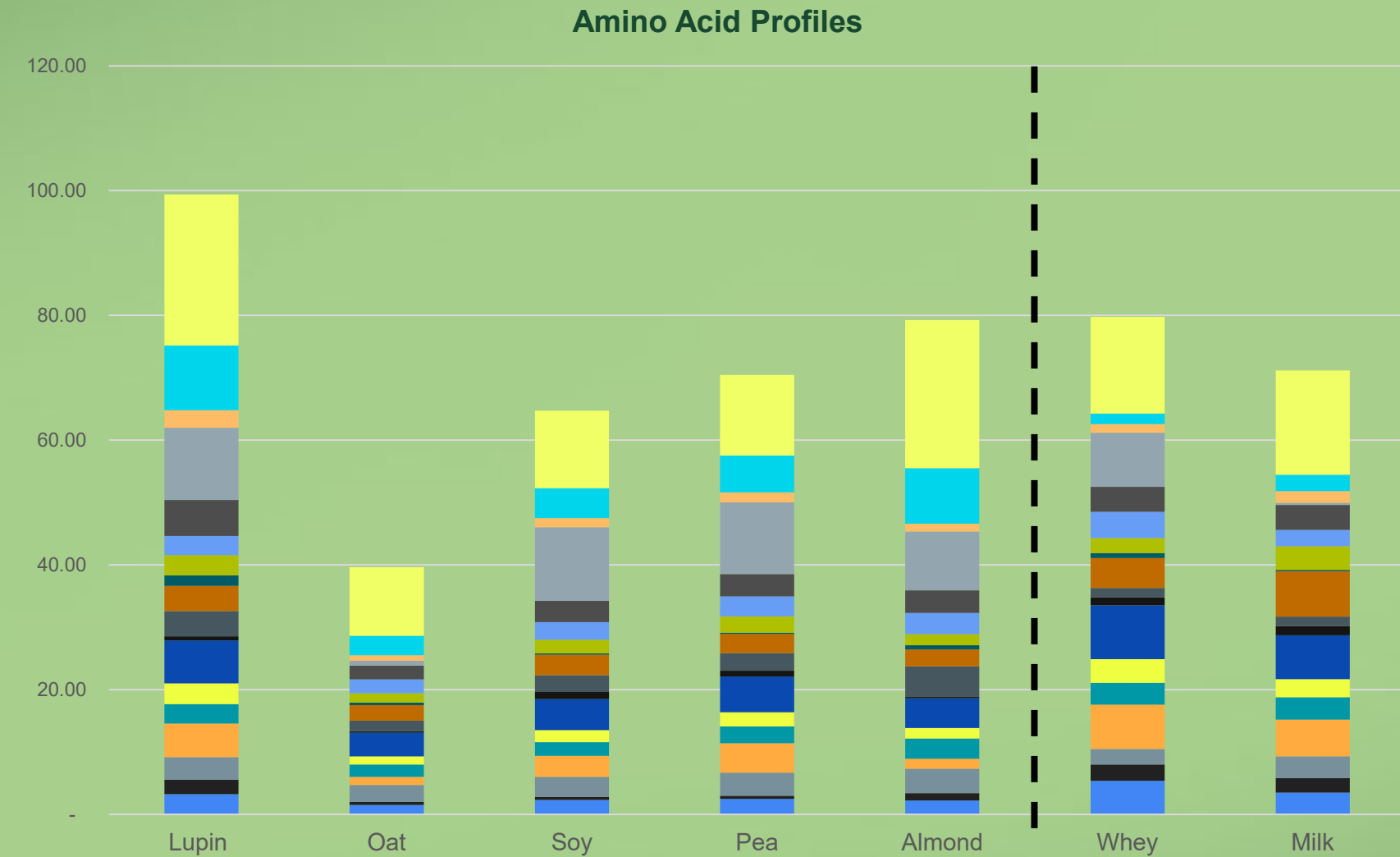
Essential Amino Acids cannot be produced by the body and therefore must be sourced from the foods we eat.

Not only is lupin high in EAAs, but they are easily digestible, with a digestibility score of 0.96 (out of 1).

# ESSENTIAL AMINO ACID PROFILE

## Lupins have the highest Total Amino Acid profiles compared to other key protein sources

# TOTAL AMINO ACID PROFILE



Lupins are naturally high in these key Amino Acids which are important for gut health, immune system functioning and muscle recovery and repair

\* Essential Amino Acid

# IMPROVED **CARDIO-METABOLIC HEALTH**



Scientific studies show that consuming lupin protein positively impacts cardio-metabolic health by:

LOWERING CHOLESTEROL

LOWERING BLOOD PRESSURE

IMPROVING BLOOD GLUCOSE CONTROL

**LOWERS CHOLESTEROL:** consuming lupin protein resulted in reduced cholesterol levels and improved HDL (good) : LDL (bad) cholesterol ratios<sup>2,3,4,5,6,7</sup>.

**LOWERS BLOOD PRESSURE:** consuming lupin protein can assist with hypertension and reduce blood pressure<sup>1</sup>.

**BLOOD GLUCOSE CONTROL:** lupin protein helps manage diabetes through activating insulin signalling pathways, increasing insulin sensitivity and promoting glucose uptake to help muscle cells absorb glucose and synthesize glycogen<sup>11, 16,17,18</sup>.

Clinical and biochemical studies have shown evidence of

↓ **REDUCED** ↓  
**Overall Cholesterol**

on consuming lupin protein<sup>2,3,4,5,6,7</sup>

**LOWERS**  
**CHOLESTEROL**

Recent studies also reported improved ratio of HDL (good fats) : LDL (bad fats) through activating the LDL receptors in the body.



# LOWERS BLOOD PRESSURE

Recent studies have shown that including lupin protein in diets can:

- Assist with controlling hypertension
- Reduce blood systolic pressure<sup>1</sup>



Lupin protein is one of the **BEST NATURAL SOURCES** of Arginine, which is biochemically proven to improve blood vessel performance.



# IMPROVED BLOOD-SUGAR MANAGEMENT

Lupin protein may assist managing diabetes through activating insulin signalling pathways, increasing insulin sensitivity and promoting glucose uptake to help muscle cells absorb glucose and synthesize glycogen<sup>11,16,17,18</sup>

A number of acute studies have demonstrated improvements in postprandial glycaemia and insulinaemia with lupin protein consumption.





# MUSCLE RECOVERY AND REPAIR

lupin protein is a naturally high source of L-arginine, that supports blood flow during periods of muscular recovery, repair and growth



L-Arginine has been shown to mediate nitric oxide production and has strong antioxidant properties. It has therapeutic potential in preventing and mitigating various health conditions, including:

- Cardiovascular diseases
- Neurodegenerative diseases
- Metabolic disorders
- Immune function and Anti-aging effects<sup>25</sup>.



# MUSCULAR GROWTH

Lupin protein is a good source of lysine, helpful in supporting athletic performance<sup>28</sup>

Lupin protein is also high in leucine, which is the primary driving force behind the development of new muscle and overall muscle health<sup>27</sup>





# FERTILITY



**Lupin is a rich source of L-arginine, which plays a key role in women's hemodynamic adaptations during gestation**

L-arginine may help regulate many metabolic pathways that are vital to reproduction, growth, and health and its deficiency may lead to pregnancy complications such as pre-eclampsia<sup>29</sup>

Lupin protein contains high levels of glutamine, an Essential Amino Acid for pregnant mothers, that fuels growth and development and plays a vital role in fetal metabolism<sup>26</sup>.

# MACULAR DEGENERATION

## Lupin protein is a rich source of lutein

Lutein can delay the start of, and slows down the development of, the consequences of age-related macular degeneration (AMD)<sup>21</sup>.

Lutein does not cure AMD, but it can slow the progression of this disease.





# NATURAL CYTOTOXIC AGENT



A recent study found lupin protein extracts to be effective at preserving the viability of healthy cells in breast cancer patients, opening up further avenues of research into the disease<sup>20</sup>

# NEXT STEPS

- Work with Universities, Governments and Independent Research Organisations to further explore the health benefits of lupin protein
- Work with food companies and consumer organisations to highlight the benefits of lupin in their product development programmes and their consumer advertising
- Develop a consumer and customer messaging plan highlighting the benefits of consuming lupin protein



# References

1. Pilvi TK, et al (2006) Lupin protein attenuates the development of hypertension and normalises the vascular function of NaCl-loaded Goto-Kakizaki rats. *J Physiol Pharmacol.* 57(2):167–76.
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5. Weisse K et al (2009) Lupin protein isolate and cysteine-supplemented casein reduce calcification of atherosclerotic lesions in apoE-deficient mice. *British Journal of Nutrition* (2010), 103, 180–188
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- 16 Soto-Luns I et al (2020) Lupin protein isolate improves insulin sensitivity and steatohepatitis in vivo and modulates the expression of the *Fasn*, *Gys2*, and *Gsk3b* genes. *Food Sci Nutr.* 2021;9:2549–2560.
- 17 Santana SM et al (2018) Narrow-leafed lupin (*Lupinus angustifolius* L.) seed  $\beta$ -conglutins reverse the induced insulin resistance in pancreatic cells. *Food Funct.* 2018 Oct 17;9(10):5176–5188. doi: 10.1039/c8fo01164h
- 18 Lima-Cabello E et al (2016) Narrow-leafed lupin  $\beta$ -conglutins modulate the insulin signalling pathway as potential type 2 diabetes treatment and inflammatory related disease amelioration. *mnf-journal.com*

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- 21 Fryirs C, et al (2008) Luteins in lupins – an eye for health. In: Palta J A., Berger JD (Eds.):Proceedings of the 12th International lupin conference. CSIRO Plant Industry, Wembley, Western Australia
- 22 Magni, C et al. (2004). Conglutin  $\gamma$ , a lupin seed protein, binds insulin in vitro and reduces plasma glucose levels of hyperglycemic rats. *J. Nutr. Biochem.* 15:646.
- 23 Terruzzi, I (2001) Insulin-mimetic action of Conglutin  $\gamma$ , a lupin protein, in mouse myoblast. *Nutr Metab Cardio-vasc Dis.* 21:197–205
- 24 Tapadia M et al (2021) Antidiabetic effects and mechanisms of action of  $\gamma$ -conglutin from lupin seeds. *Journal of Functional Foods* 87 (2021) 104786
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- 27 [How Leucine Supports Muscle Health and Other Benefits](#)
- 28 [L-Lysine Benefits: From Anxiety to Muscle Growth – The Nutrition Insider](#)
- 29 [The role of L-Arginine in the prevention and treatment of pre-eclampsia: A systematic review of randomised trials – Research @ Flinders](#)



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# Thank You

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