AGRAIN: THE MOST ENVIRONMENTALLY SUSTAINABLE PROTEIN SOURCE

Agrain flour has an exceptional nutritional profile containing approximately 50% fibre and 15-20% protein. It contains all 9 essential amino acids - protein compounds that the human body cannot synthesise itself, and therefore need to be included in our diet.

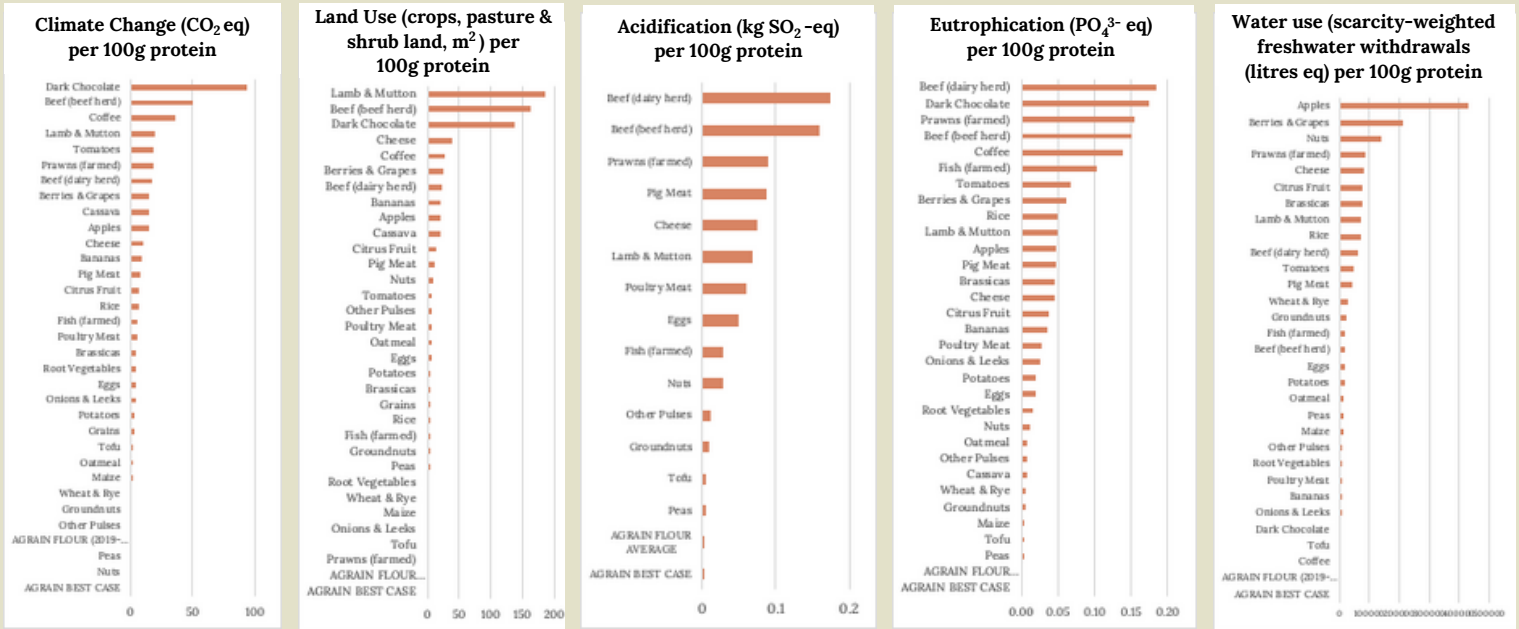
These proteins are commonly found in meat, dairy and soy products. While they can be nutritious, these high protein foods often aren't very environmentally sustainable. Therefore, we investigated how sustainable Agrain flour is as a source of protein by comparing the environmental impact of Agrain flour per 100g protein against 90% of all food consumed in the world.

LCA CERTIFIED

The environmental sustainability comparison of Agrain flour at food level was conducted as part of the **Life Cycle Assessment** (LCA) undertaken by Re-Viu, a third-party environmental evaluation expert, together with Agrain sustainability team (1, 2). The study compared Agrain flour's environmental impact across **5 key impact categories** where food has the largest impact (Land Use, Climate Change, Acidification, Eutrophication, and Water Use) to a published scientific analysis of the environmental impact of 90% of all food consumed in terms of protein and calories (3).

MORE ENVIRONMENTALLY SUSTAINABLE THAN 90% OF FOOD PER 100G PROTEIN

Data on Agrain flour was based on an average over 4 years of production (2019-2022). 1kg of Agrain flour (packaged and in store) was evaluated, and comparisons made per 100g of protein to other food products across the five impact categories (Figures 1-5).



Figures 1-5: Agrain Flour 'Average' (2019-2022) and 'Best Case' compared with 90% of all food consumed in the world across 5 impact categories. NB: Acidification results are limited by availability of data.

Per 100g protein, Agrain flour has the **lowest impact** in terms of Land Use, Acidification, Eutrophication and Water Use compared to all other foods assessed. In terms of Climate Change, Agrain flour was worse only than peas and nuts per 100g protein. Overall, taking all 5 impact categories into account, **Agrain flour proved to be the most environmentally sustainable protein source** with the lowest overall impact compared other foods per 100g protein.

AGRAIN CAN BE EVEN BETTER

In a 'Best Case' scenario, Agrain flour can become the best performing in the 'Climate Change' category by emitting as little as 0.14 kg CO2eq per 100g protein. That's 93% less than Tofu! Our goal is to reduce our CO2 emissions to this level. This can be achieved with just **four realistic improvements**:

1. *Upcycling spent grain liquid in addition to the separated grains*
2. *Eliminating all flour waste through more efficient processing*
3. *Cutting transport impacts by processing flour and liquid on-site at breweries*
4. *Using 100% renewable energy*

DID YOU KNOW?

IF ALL OF THE WORLD'S SPENT GRAIN WAS UPCYCLED INTO FLOUR, THERE WOULD BE ENOUGH TO MEET THE PROTEIN REQUIREMENTS OF SEVEN % OF CHILDREN

REFERENCES

(1) Feced, M. & Beukel, K. (2023) *Agrain Life Cycle Analysis (LCA). Circular Food Technology (Agrain).*

(2) The report was further validated by independent auditor Bureau Veritas, in compliance with ISO14040 and ISO14044.

(3) Poore, J. and T. Nemecek. (2018). Reducing food's environmental impacts through producers and consumers. Science, 360 (6392), *pp.* 987-992.

NB: Based on 3rd party validated comparative LCA report. Method: Cradle to retail, examining 5 hotspot categories as in Poore & Nemecek (2018): Climate change, Land-use, Acidification, Eutrophication, Scarcity Weighted freshwater withdrawn. Comparing Agrain flour to food products covering 90% of global food consumption (measured by calorie and protein). Agrain flour (average 4 years) performing best in 4 out of 5 categories on emissions per 100g protein, and Agrain performing 3rd in remaining category. Comparative LCA report available on request.