January 28, 2022

Submitted via email to submissions@foodstandards.gov.au

To: Food Standards Australia & New Zealand

Re: Application A1232 - Food derived from drought-tolerant and herbicide-tolerant wheat line IND-00412-7'

Dear Sir & Madam:

My name is [redacted]. My PhD is in plant biology, and my dissertation research involved plant genetic engineering. I have experience analyzing and writing about the regulation of genetically engineered organisms. On behalf of The Breakthrough Institute, I provide comments on Application A1232 - Food derived from drought-tolerant and herbicide-tolerant wheat line IND-00412-7'.

Food systems are responsible for one-third of global greenhouse gas emissions. Deforestation motivated by agricultural expansion releases the carbon stored by plants as greenhouse gases and is itself responsible for more than 10% of all emissions. Deforestation fuels climate change, which in turn reduces agricultural productivity, thereby fueling more deforestation. Climate change has already reduced the growth of agricultural productivity by 21% since 1961, and as time goes by, that penalty will worsen. To compensate, countries could wind up converting more forests into farms, which will then further release greenhouse gases.

As global demand for food and other agricultural products continues to grow, crop yield increases reduce the need to add new land into production, thus preventing additional greenhouse gas emissions. Crop yield increases have historically played a crucial role in limiting land conversion and associated emissions — without them, land use for cereal production would have expanded over 6 times more than it did. Improvements in crop genetics have contributed roughly half of historical yield gains, making yield growth a powerful way to reduce emissions.

Drought-tolerant HB4 wheat can increase crop yields by 20% under drought conditions, which is increasingly important as climate change increases the frequency and severity of drought. Argentina is increasingly facing drought that impacts wheat production; for example, the 2020/2021 Argentinian wheat harvest had the lowest yields in the last five years, partially due to drought. The area of Argentina wheat production experiencing drought ranged from about 15-70% during the May–December growing season, with the provinces of Entre Rios, Santa Fe, and Cordoba most affected; together, these four provinces account for about 50% of Argentina's wheat production area.

If drought-tolerant HB4 wheat had been cultivated on even one-third of Argentina's wheat-growing areas in 2020, the associated yield increase would have reduced deforestation for farmland expansion elsewhere in the world. This would have decreased the global

greenhouse gas emissions associated with wheat production by 0.64 million metric tons of CO2 equivalents per year (MtCO2e/yr), equal to 34% of the yearly on-farm emissions from all Argentina's wheat production. We conducted another analysis using these same methods, published as a preprint on bioRxiv and in press at Trends in Plant Science.

To maximize the environmental potential of biotechnology, countries must also allow for imports of human-edible genetically-engineered (GE) foods such as wheat. Wheat is largely used for human consumption, while GE soybean, maize, cotton, canola, and sugarbeet mainly go to animal feed, non-food products, and/or highly processed products for human consumption (which contain little to no remaining genetic material). After 28 years of commercialized GE crops in the US, Argentina finally commercialized HB4 wheat — the world's first GE wheat — in 2020. Regulations in many countries prevent the import of GE crops for human consumption, which has hampered the commercialization of GE wheat even in the US. Global regulatory change is needed to amplify the global benefit from GE crops.

By importing products of drought-tolerant HB4 wheat from Argentina, Australia and New Zealand would help decrease global greenhouse gas emissions associated with wheat production. Drought-tolerant HB4 wheat is undergoing regulatory processes in many countries — including the US, Paraguay, Uruguay, and Bolivia — and the outcomes of these decisions will impact the extent to which HB4 wheat is grown globally. The more widely HB4 wheat is grown, the greater impact it can have in decreasing global agricultural greenhouse gas emissions.

Conversely, by foregoing opportunities to increase crop yields, Australia and New Zealand are promoting agricultural expansion and deforestation in poorer nations.

In addition to decreasing greenhouse gas emissions associated with wheat production, HB4 wheat can help increase the stability of wheat supply. The frequency and severity of drought is increasing due to climate change, and this decreases the stability of wheat production from year to year.

We urge Australia and New Zealand to join the many countries worldwide that are supporting the use of genetic engineering to reduce the environmental impacts of agriculture. Through global agricultural trade, greenhouse gas emissions from food production are a global problem that requires global solutions.

METHODS

Our analysis is based on the 2020/2021 wheat production year in Argentina because this year had the lowest yields of the last five years, due in part to drought. We conducted this analysis using the Searchinger *et al.* (2018) Carbon Benefits Calculator, with methods described in our preprint on bioRxiv (paper in press at Trends in Plant Science), with the following modifications. Bioceres, the company that developed HB4 wheat, estimates that it will eventually be grown on one-third of Argentina's wheat production area, which we use in our analysis. We use a conservative half of the average 20% yield increase under drought due to HB4 wheat in our

analysis. We assumed that only half of the increased crop production in Argentina leads to decreased crop production elsewhere, so we reduced the percentage of replacement crops attributed to intensification to 50%. We increased fertilizer application by 10% to match the 10% yield increase. We use data on Argentina's wheat production from the Buenos Aires Grain Exchange (Bolsa de Cereales), including 2020/21 average wheat yield of 2.82 t/ha, total area planted to wheat of 6.5 million hectares, and average nitrogen fertilizer application to wheat crops of 69 kg/ha.

Thank you for your consideration of these comments. Please do not hesitate to contact me if you have any questions.

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