nutrients

Supplementary Materials

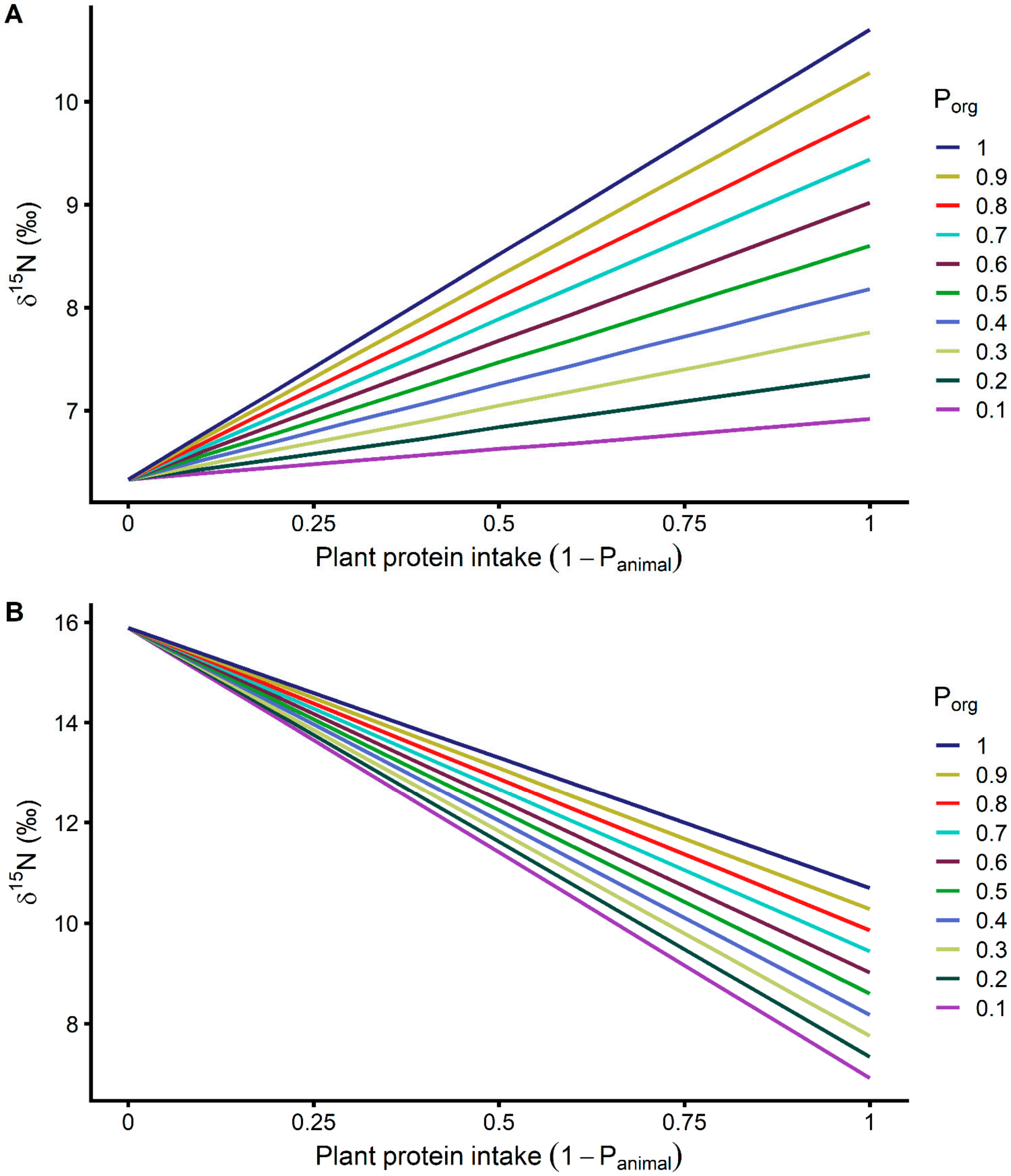

Figure S1. Model output (equation 2) showing $\delta^{15}N_{tissue\ proteins}$ at the low (A) and high (B) ends of the $\delta^{15}N_{animal}$ spectrum. Proportional plant protein intake (1-P_{animal}) varies from 0 to 1 with 0.1 increments in proportional organic plant intake (P_{org}) plotted.

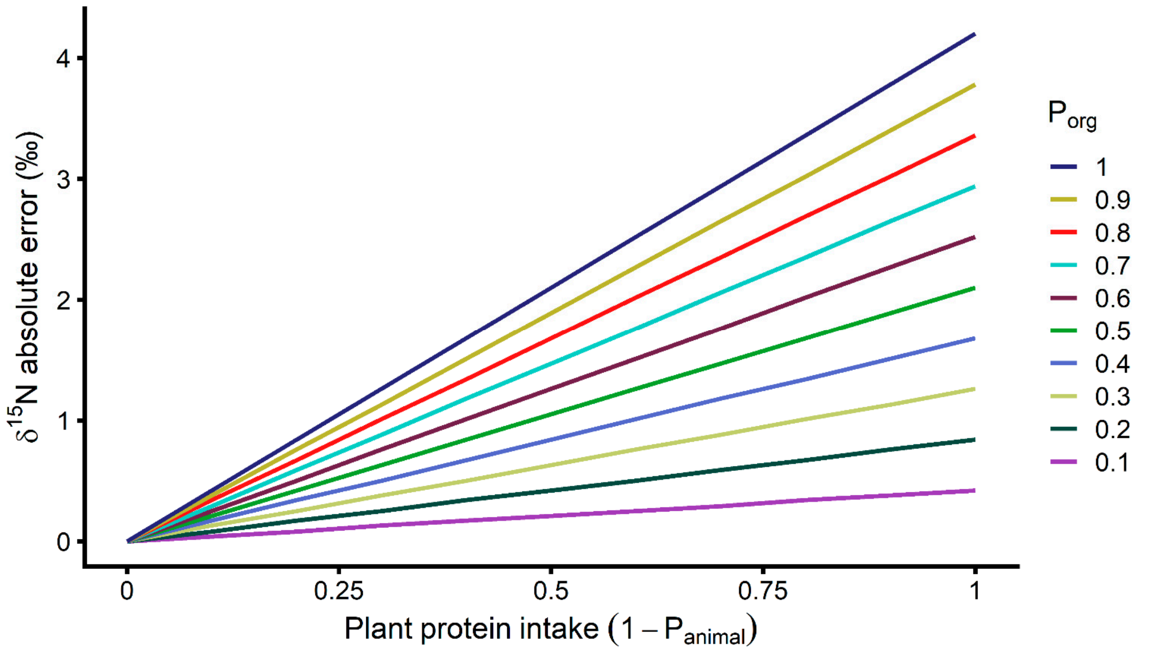

Figure S2. $\delta^{15}N$ absolute difference resulting from organic plant intake (equation 3). This absolute error is independent of $\delta^{15}N_{animal}$. Proportional plant protein intake ($1-P_{animal}$) varies from 0 to 1 with 0.1 increments in proportional organic plant intake (P_{org}) plotted.

Table S1. Edible plant δ15N values. The δ15N values were used for estimating $\Delta_{org\text{-}conv}$ in equation 1 and are plotted in Figure 1.

Edible plants	Fertilization type	δ15N	SD	*n*	References
Brassica oleracea L	conventional	3.6	2.9	3	[1]
Brassica oleracea L	organic	16.3	0.4	2	[1]
Broccoli	conventional	4.3		3	[2]
Broccoli	conventional	3.92	2.25	12	[3]
Broccoli	organic	12.2		3	[2]
Broccoli	organic	6.08	1.76	5	[3]
Broccoli	organic	8.96	1.32	9	[3]
Broccoli	organic	12.57	2.81	15	[3]
Cabbage	conventional	5.7			[4] data from [5]
Cabbage	organic	8.7			[4] data from [5]
Carrot	conventional	4.1	2.6	17	[6]
Carrot	conventional	3.9	2.3	5	[7]
Carrot	conventional	3.5	0.4		[8]data from [5]
Carrot	organic	5.7	3.5	13	[6]
Carrot	organic	3.7	1.4	5	[7]
Carrot	organic	6.7	1.0		[8] data from [5]
Cauliflower	conventional	5.5	2.7	3	[7]
Cauliflower	organic	10.7	4.3	3	[7]
Chicory Palla rosa	organic	7.7	1.4	4	[7]
Chicory Palla rosa	conventional	2.0	0.8	3	[7]
Chicory Pan di zucherro	organic	5.3	1.7	3	[7]
Chicory Pan di zucherro	conventional	2.3	1.4	3	[7]
Clementine	conventional	6.9		21	[9] data from [10]
Clementine	organic	7.2		31	[9] data from [10]
Corn	conventional	0.8		3	[2]
Corn	organic	4.8		3	[2]
Cucumber	conventional	2.7		3	[2]
Cucumber	conventional	3.3	1.4	4	[1]
Cucumber	organic	12.3		3	[2]
Cucumber	organic	13.3	2.6	4	[1]

Eggplant	organic	8.5		3	[2]
Eggplant	conventional	4.5		3	[2]
Eggplant	conventional	2.7	3.0	2	[1]
Eggplant	organic	13.4		1	[1]
Endive	conventional	0.6	2.7	3	[7]
Endive	organic	6.9	1.1	5	[7]
Garlic	conventional	2.6	2.6	3	[7]
Garlic	organic	4.3	1.9	3	[7]
Kohlrabi	conventional	7.8	1.3	3	[7]
Kohlrabi	organic	6.2	4.3	3	[7]
Leek	conventional	1.9	1.0	4	[7]
Leek	organic	7.3	3.0	4	[7]
Lettuce	conventional	5.2		3	[11]
Lettuce	organic	9.6		3	[11]
Lettuce	organic	11.9	2.73	30	[3]
Lettuce	conventional	2.9	4.3	55	[6]
Lettuce	conventional	5.3		3	[11]
Lettuce	conventional	1.77	1.71	10	[3]
Lettuce	conventional	2.2			[8] data from [5]
Lettuce	conventional	4.1	0.6	2	[1]
Lettuce	organic	7.6	4.1	49	[6]
Lettuce	organic	8.0		3	[11]
Lettuce	organic	21.89	2.08	9	[3]
Lettuce	organic	5.68	1.17	23	[3]
Lettuce	organic	5.5			[8] data from [5]
Lettuce	organic	13.5	1.0	4	[1]
Maize	organic	8.1	1.6	6	[12]
Maize	conventional	5.8	0.2	6	[12]
Maize	conventional	4.2	1.1	2	[1]
Maize	organic	21.2	0.2	6	[12]
Maize	organic	17.7	4.3	2	[1]
Onion	conventional	5.2	1.8	3	[7]

Onion	organic	6.8	1.6	3	[7]
Orange	conventional	5.5		56	[9] data from [10]
Orange	conventional	4.64	0.35		[13]
Orange	organic	7.6		42	[9] data from [10]
Orange	organic	6.74	0.7		[13]
Orange	organic	8.95	0.38		[13]
Orange	organic	8.45	0.61		[13]
Parsley	conventional	4.5	4.5	3	[7]
Parsley	organic	5.4	1.1	6	[7]
Peach	conventional	0.1		24	[9] data from [10]
Peach	organic	1.9		95	[9] data from [10]
Peas	organic	0.3		3	[2]
Peas	conventional	0.2		3	[2]
Pepper	conventional	-2.4			[14]
Pepper	organic	4.3	0.2	3	[7]
Pepper	conventional	-0.5			[14]
Pepper	conventional	2.2			[14]
Pepper	conventional	3.5	0.7	3	[7]
Pepper	conventional	4.7	0.9	3	[1]
Pepper	organic	7.9			[14]
Pepper	organic	14.5	1.2	2	[1]
Pepper	conventional	8.72			[15]
Pepper	organic	11.16			[15]
Perilla ocymoides L	conventional	4.5		1	[1]
Perilla ocymoides L	organic	19.9		1	[1]
Potato	conventional	2.23		9	[16]
Potato	conventional	3.76		10	[16]
Potato	conventional	4.13		10	[16]
Potato	conventional	3.23		10	[16]
Potato	conventional	0.9		3	[2]
Potato	organic	5.7		10	[16]
Potato	organic	6.99		9	[16]

Potato	organic	10.34		10	[16]
Potato	organic	5.68		10	[16]
Potato	organic	4.3		3	[2]
Potato	conventional	3.8	1.1	4	[7]
Potato	organic	8.4	2.2	3	[7]
Pumpkin	organic	5.7		3	[2]
Pumpkin	conventional	3.5		3	[2]
Rice	conventional	3.0	0.3	3	[17]
Rice	conventional	3.5	0.3	3	[17]
Rice	conventional	4.1	1.2	3	[17]
Rice	conventional	4.11		5	[18]
Rice	conventional	3.87	0.89	60	[19]
Rice	organic	4.9	0.3	3	[17]
Rice	organic	5.5	0.1	3	[17]
Rice	organic	4.8	0.1	3	[17]
Rice	organic	6.02		5	[18]
Rice	organic	6.07	0.65	60	[19]
Rocket	conventional	1.1	1.6	3	[7]
Rocket	organic	7.2	4.1	5	[7]
Sesame	conventional	5.7		1	[1]
Sesame	organic	17.8	4.8	2	[1]
Spinach	conventional	3.05	0.94	22	[3]
Spinach	conventional	5.6	1.1	2	[1]
Spinach	organic	12.20	1.26	20	[3]
Spinach	organic	11.06	1.53	20	[3]
Spinach	organic	7.20	1.66	14	[3]
Spinach	organic	9.5	0.2	2	[1]
Strawberry	conventional	2.5		82	[9] data from [10]
Strawberry	organic	3.5		82	[9] data from [10]
Tomato	conventional	-1.2		3	[2]
Tomato	conventional	-0.7		3	[2]
Tomato	conventional	7.8		3	[2]

Tomato	conventional	2.09	0.78	6	[20]
Tomato	organic	8.1	3.2	61	[6]
Tomato	organic	6.9		3	[2]
Tomato	conventional	-0.1	2.1	46	[6]
Tomato	conventional	-2.4			[14]
Tomato	conventional	0			[14]
Tomato	conventional	1.19	1.71	5	[3]
Tomato	conventional	1.28	1.34	5	[3]
Tomato	conventional	4.4	3.2	3	[7]
Tomato	conventional	0.92	0.30	6	[20]
Tomato	conventional	1.34	0.23	6	[20]
Tomato	conventional	0.24	0.04	6	[20]
Tomato	conventional	0.43	0.11	6	[20]
Tomato	conventional	0.32	0.08	6	[20]
Tomato	conventional	-2.5	2.0		[8] data from [5]
Tomato	conventional	0.3	0.6		[21] data from [5]
Tomato	organic	7.3		3	[2]
Tomato	organic	9.3			[14]
Tomato	organic	5.57	2.66	20	[3]
Tomato	organic	0.70	0.59	2	[3]
Tomato	organic	4.88	0.97	4	[3]
Tomato	organic	7.82	2.16	5	[3]
Tomato	organic	8.0	1.3	3	[7]
Tomato	organic	5.46	0.90	6	[20]
Tomato	organic	2.63	0.43	6	[20]
Tomato	organic	2.35	0.54	6	[20]
Tomato	organic	1.28	0.15	6	[20]
Tomato	organic	1.61	0.18	6	[20]
Tomato	organic	0.90	0.07	6	[20]
Tomato	organic	5.9	2.0		[8] data from [5]
Tomato	organic	7.1	0.7		[21] data from [5]
Wheat	organic	7.3	0.6	2	[22]

Wheat	conventional	2.3	1.0		[14]
Wheat	conventional	1.4	0.4	2	[22]
Wheat	conventional	1.2	0.3	2	[22]
Wheat	conventional	1.1	0.1	2	[22]
Wheat	organic	3.6	1.6		[14]
Wheat	organic	5.4	0.3	2	[22]
Wheat	organic	7.3	0.1	2	[22]
Wheat	organic	2.6	0.4	2	[22]
Wheat	organic	0.8	0.4	2	[22]
Wheat	organic	0.5	0.3	2	[22]
Zucchini	conventional	2.4		3	[2]
Zucchini	organic	10.6		3	[2]

SD, standard deviation.

Text S1. Calculations of the effect of organic food intake on tissue proteins $\delta^{15}N$.

In order to relate the $\delta^{15}N$ of tissue proteins ($\delta^{15}N_{tissue\ proteins}$) to the $\delta^{15}N$ of consumed animal proteins ($\delta^{15}N_{animal}$) and plant proteins ($\delta^{15}N_{plants}$), a two-sources isotope mixing model was used:

$$\delta^{15}N_{tissue\ proteins} = \delta^{15}N_{animal} \times P_{animal} + \delta^{15}N_{plants} \times (1\text{-}P_{animal}) + \Delta^{15}N_{tissue\text{-}diet} \quad (1)$$

where $\delta^{15}N_{animal}$ and $\delta^{15}N_{plants}$ are weighted by P_{animal} and $1\text{-}P_{animal}$, the proportions of dietary proteins occupied by animal and plant proteins, respectively (and where protein refers to protein nitrogen). $\Delta^{15}N_{tissue\text{-}diet}$ is the isotopic offset between tissue and dietary proteins, often referred to as the trophic step or discrimination factor. The effect of organic plant intake on $\delta^{15}N_{plants}$ was then similarly calculated with a two-sources isotope mixing model accounting for organic and conventional plants intake:

$$\delta^{15}N_{plants} = \delta^{15}N_{org\ plants} \times P_{org} + \delta^{15}N_{conv\ plants} \times (1\text{-}P_{org}) \quad (2)$$

where $\delta^{15}N_{org\ plants}$ and $\delta^{15}N_{conv\ plants}$ are the weighted average of the $\delta^{15}N$ of consumed organically and conventionally grown plants, respectively. P_{org} is the proportion of dietary plant proteins occupied by proteins from organically grown plants and 1- P_{org} is the proportion occupied by conventionally grown plants (and where protein refers to protein nitrogen). Rearranging equation 2 and substituting it into equation 1 yields the following equation:

$$\delta^{15}N_{tissue\ proteins} = \delta^{15}N_{animal} \times P_{animal} + [\ \delta^{15}N_{conv\ plants} + (\delta^{15}N_{org\ plants} - \delta^{15}N_{conv\ plants}) \times P_{org}\ ] \times (1\text{-}P_{animal}) + \Delta^{15}N_{tissue\text{-}diet} \quad (3)$$

The difference between $\delta^{15}N_{org\ plants}$ and $\delta^{15}N_{conv\ plants}$ has already been reported in the literature using the capital delta notation ($\Delta^{15}N_{org\text{-}conv} = \delta^{15}N_{org\ plants} - \delta^{15}N_{conv\ plants}$), therefore to simplify the equation, this notation was substituted into equation 3:

$$\delta^{15}N_{tissue\ proteins} = \delta^{15}N_{animal} \times P_{animal} + (\delta^{15}N_{conv\ plants} + \Delta^{15}N_{org\text{-}conv} \times P_{org}) \times (1\text{-}P_{animal}) + \Delta^{15}N_{tissue\text{-}diet} \quad (4)$$

When organic plants with a higher $\delta^{15}N$ than conventionally grown plants are consumed, the effect on $\delta^{15}N_{tissue\ proteins}$ can be calculated and is referred here as the error. The absolute error is the difference between the actual measured value obtained with equation 4 and the expected values when no organic plants are consumed, which is also obtained with equation 4, but with P_{org} set at 0. Subtracting these two equations gives:

$$\delta^{15}N \text{ absolute error} = \Delta^{15}N_{org\text{-}conv} \times P_{org} \times (1\text{-}P_{animal}) \quad (5)$$

The relative error was then calculated by dividing the absolute error by the expected value when no organic plants are consumed, obtained from equation 4 with P_{org} set at 0:

$$\delta^{15}N \text{ relative error} = 100 \times \Delta^{15}N_{org\text{-}conv} \times P_{org} \times (1\text{-}P_{animal}) \ /\ [\ \delta^{15}N_{animal} \times P_{animal} + \delta^{15}N_{conv\ plants} \times (1\text{-}P_{animal}) + \Delta^{15}N_{tissue\text{-}diet}\ ] \quad (6)$$

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