Supplementary Table 1: Food weight in the menus for the three main meals (breakfast, lunch and dinner) and that of additional food items.

Menu #	**Breakfast**				**Lunch**				**Dinner**				**Extra food**		
	Food 1	*g*	*Food 2*	*g*	*Food 3*	*g*	*Food 4*	*g*	*Food 5*	*g*	*Food 6*	*g*	*Food 7*	*g*	*Total g*
Vegan (VEG) Diet															
1	Almonds[1]	12	Soy Milk	100	Pasta[2]	70	Beans [3]	30	Soybean [4]	32	CLF [5]	100	Potato[6]	120	464
2	CornFL	30	Soy Milk	150	Pasta[2]	80	Pleurotus	125	Lentils [7]	130	CLF [5]	200	Potato[6]	100	815
3	Bread[8]	50	Soy Milk	130	Rice	100	Eggplants [9]	150	Beans [3]	160	Zuchini [10]	150	Potato[6]	130	870
4	Pistachios[11]	10	Soy Milk	100	Eggplant [9]	100	Soybean [4]	35	Rice	80	Pea [12]	80	Bread[8]	50	455
5	Walnuts[13]	23	Soy Milk	150	Pasta[2]	70	Lentils [7]	125	Pistachio[11]	40	CLF [5]	120	Bread[8]	50	578
6	Hazelnut[14]	25	Soy Milk	100	Pasta[2]	80	Pea [12]	50	Soybean[4]	35	CLF [5]	100	Potato[6]	120	510
7	Walnuts[13]	20	Soy Milk	100	Rice	60	Pea [12]	70	Soybean[4]	35	Zuchini [10]	100	Bread[8]	50	435
Added foods to VEG menus: Lettuce (100 g); Extra virgin olive oil (EVO) (30 ml each); Fresh fruit (600 g each); Dry fruit (60 g each); either dark-chocolate (30 g each in 3 menus) or coffee (5 g in a 55 mL cup each in 5 menus); 30 g ethanol as either red wine (125 mL, 12.5% vol/vol in 3 menus) or beer (330 mL, 5% in 3 menus).															
Lacto-Ovo Vegetarian (LO) Diet															
8	Bread [8]	50	Egg [15]	55	Pasta [2]	100	Lentils [7]	130	Ricotta	35	Hazelnut [14]	15	Potato[6]	150	535
9	CornFL	30	Milk	70	Egg [15]	110	CLF [5]	170	Rice	60	Peas [12]	125	Potato[6]	150	715
10	Bread [8]	50	Milk	100	Gorgonzola	40	Beans [3]	130	Rice	70	Tomato	100	Bread[8]	60	550
11	Bread [8]	40	Milk	80	Parmesan	25	Eggplants [9]	120	Ricotta	25	Soybeans [4]	30	Bread[8]	25	345
12	Bread [8]	50	Ricotta	50	Gorgonzola	45	Beans [3]	100	Rice	60	Zucchini [10]	120	Potato[6]	150	575
13	Bread [8]	50	Almonds [1]	7	Parmesan	35	Pea [12]	150	Egg [15]	55	Asparagus	100	Potato[6]	200	597
14	Bread [8]	50	Milk	80	Egg [15]	55	Eggplants [9]	150	Ricotta	50	Lentils [7]	70	Potato[6]	150	435

Added foods to LO menus: Lettuce (100 g each); Extra virgin olive oil (EVO) (30 ml each); Fresh fruit (600 g each); Dry fruit (60 g each); either dark-chocolate (30 g each in 5 menus) or toasted coffee (5 g in a 55 mL cup each in 3 menus); and 30 g ethanol as either red wine (125 mL, 12.5% vol/vol in 3 menus) or beer (330 mL, 5% in 3 menus).															
Omnivorous (OMN) diet															
15	CornFL	30	Milk	60	Pork	60	Beans [3]	30	Rice	70	Zuchini [11]	75	Potato[6]	150	475
16	Bread [8]	30	Milk	50	Turkey	60	Potato[6]	200	Pasta [2]	70	Peas	40	Bread[8]	25	475
17	Bread [8]	70	Milk	120	Bresaola	35	Lentils [7]	50	Pistachio[11]	10	CLF [5]	50	Potato[6]	250	585
18	Bread [8]	30	Milk	50	Chicken	60	Beans [3]	35	Pasta [2]	80	Tomato	50	Potato[6]	200	505
19	Bread [8]	30	Albumen	40	Beef	60	CLF [5]	85	Ricotta	30	Lentils [7]	30	Bread[8]	100	375
20	Bread [8]	40	Bacon+Egg[15]	8+55	Cod	60	Potato[6]	200	Peas [12]	40	Almonds [1]	8	Bread[8]	50	461
21	Bread [8]	50	Milk	50	Seabass	60	Soybean	20	Hazelnut [14]	15	Dry Dates[16]	30	Potato[6]	250	475
Added foods to OMN menus: Lettuce (100 g each); Extra virgin olive oil (EVO) (30 ml each); Fresh fruit (600 g each); Dry fruit (60 g each); either dark-chocolate (30 g each in 5 menus) or toasted coffee (5 g in a 55 mL cup each in 3 menus); and 30 g ethanol as either red wine (125 mL, 12.5% vol/vol in 3 menus) or beer (330 mL, 5% in 3 menus).															

Foot-notes to the Table:

The Table reports the weight of the foods included in the three main meals, grouped for the three diet types (VEG, LO and OMN). In addition, the weight of additional foods are reported at the bottom of the group of menus of the same diet type, either as Mean ± SE (when the amounts were not the same in all menus) or as absolute value (when the amounts were identical in all menus).

The weight of the foods of the main meals are those of the edible part of the foods, if not specifically indicated by the numbered superscript notations. Otherwise, the numbered notation indicate foods for which the raw weight is reported, from which the edible part can be calculated as specified in the corresponding notation.

The weights of added foods are instead reported as raw weight.

Numbered notations:

([1]) divide by 1,2 for almond numbers

([2]) multiply by 0,89 for wheat flour weight.

([3]) as raw beans (multiply for 0.52 for e.p. beans).

([4]) as raw soybeans (multiply for 0.881 for e.p. soybeans).

([5]) as raw cauliflower (multiply for 0,585 for e.p. cauliflower).

([6]) as raw potato (multiply for 0.83 for e.p. potato)

([7]) as raw lentils (multiply by 0,917 for e.p. lentils).

([8]) multiply by 0,65 for wheat flour weight.

([9]) as raw eggplants (multiply for 0.92 for e.p. eggplants).

([10]) as raw zuchini (multiply by 0.88 for e.p. zuchini).

([11]) as raw pistachios (multiply by 0,50 for e.p. pistachios).

([12]) as raw peas (multiply by 0,31 for e.p. peas).

([13]) divide by 4,5 for walnut number.

([14]) divide by 3 for hazelnut number.

([15]) one egg = 55 g (as e.p.).

([16]) one dried date = 7.5 g.

Supplementary Table 2: The environmental footprint data of vegetal foods.

Vegetal foods	**Edible part**		**Land Use (LU) (m^2/kg)**			**Water Footprint (WF) (L/kg)**							**GHGE Kg $CO_{2\text{-eq}}$/kg**		
	Ref.	**%**	*Ref.*	raw	corr.	*Ref.*	**Total raw**	Total corr.	**Bl & G raw**	Bl & G corr.	**Grey raw**	Grey corr.	*Ref.*	**raw**	corr.
Almond	1,2	0.29	2-5	**3.73**	12.86	6,7	**9144**	31531	**6540**	22552	**1507**	5197	2-8	**2.07**	7.14
Apple	1	0.85	9	**0.8**	0.94	7	**822**	967	**694**	816	**127**	149	9	**0.43**	0.51
Apricot (dried)[1]	1	1	9	**17.42**	17.42	7	**17416**	17416	**14878**	14878	**1144**	1144	9	**5.35**	5.35
Banana	1	0.65	9	**0.6**	0.92	7	**790**	1215	**757**	1165	**33**	51	9	**1.33**	2.05
Beans	1	0.52	10, 11	**3.37**	6.48	7	**561**	1079	**374**	719	**188**	362	10	**1.7**	3.27
Cauliflowers	1,12	0.59	12	**0.32**	0.54	7	**285**	483	**210**	356	**75**	127	13	**4.25**	7.20
Chocolate[2]	1	1	9,14,15	**20**	20	7	**21084**	21084	**20894**	20894	**189**	189	9,14,15	**0.78**	0.78
Coffee	1	1	9	**14.3**	14.3	7	**18925**	**18925**	**18292**	**18292**	**633**	633	9	**8.1**	8.1
Dates (dried)[3]	1	0.9	9	**3.40**	3.78	7	**4554**	5060	**4360**	4844	**192**	218	9	**0.64**	0.71
Eggplants	1	0.92	16	**0.3**[4]	0.33	7	**362**	393	**267**	290	**95**	103	17	**2.3**[4]	2.50
Figs (fresh)	1	0.75	9	**3.8**	5.01	7	**3350**	4467	**3122**	4163	**228**	304	9	**0.43**	0.57
Figs (dried)[5]	1	0.85	9	**24.7**	29.10	7	**24738**	29104	**14878**	23911	**1484**	1746	9	**2,8**	3.29
Grapes [6]	1	0.94	9	**5.06**	5.38	7	**2433**	2588	**2086**	2219	**347**	369	9	**1.93**	2.06
Hazelnuts	1	0.42	18,19	**3.09**	7.36	7	**5258**	12519	**4903**	11674	**354**	843	8	**0,52**	1,24
Kiwi	1	0.85	9	**0.60**	0.71	7	**514**	605	**475**	559	**38**	45	7	**0.08**	0,09
Lentils	1	0.92	20	**6.7**[7]	7.28	7	**5874**	6385	**4813**	5232	**1060**	1152	13	**1.3**[7]	1.41

[1] Assuming a 12,44 ratio between fresh and dried apricots (calculated from their carbohydrate ratio) (OSM Supplementary Ref. 1).

[2] The nutritional and environmental footprint parameters of chocolate are difficult to retrieve from the literature, because of incomplete specifications. As concerns the chocolate's edible part and nutrient composition, we relied on the CREA data (OSM Supplementary Ref. 1), referred to (presumably) 50% dark chocolate, as judged from its ≈35% lipid content. The Land Use and GHGE data were retrieved from Audsley et al. (OSM Supplementary Ref. 9), those of the Water Footprint from Mekkonen (OSM Supplementary Ref. 7). The LU, GHGE and WF data are referred to 1 kg cocoa beans. Therefore, to convert them to 1 kg chocolate, we relied on the published requirement of 400 cocoa beans to make 1 pound "chocolate" (i.e. 882 beans/kg chocolate, (OSM Supplementary Ref. 14), as well as on the reported average weight of 1.2 g for one cocoa bean (OSM Supplementary Ref. 15). Therefore, 822 cocoa beans would weight 1.058 kg. and be necessary to make 1 kg chocolate. Therefore, the here reported LU and GHGE data for 1 kg "chocolate" are those referred to 1.058 kg cocoa beans. Since in the referenced publication (OSM Supplementary Ref. 14) it is not specified the chocolate type, the data are provisionally referred to "chocolate" in general.

[3] The LU, water FP and GHGE values of dry dates have been derived from those of fresh dates, assuming a weight ratio of 2 to 1, between fresh and dry dates (on turn calculated from their average ratio in major nutrients' content) (see the database of the European Institute of Oncology) (Ref. 40 Main Text) (http://www,bda-ieo,it/).

[4] As the average of vegetables, according to the cited Refs.

[5] Extrapolated from the fresh fig data, assuming a ratio [6.51/1] between fresh vs dried figs (calculated as mean values of the ratios between their content in major nutrients and energy).

[6] Assuming a 4.6 ratio between fresh and dried grapes (calculated from their carbohydrate ratio).

[7] Taken as the average value of legumes for land use (OSM Supplementary Ref. 20) and GHGE (OSM Supplementary Ref. 13).

Lettuce	1	0.8	9	**0.5**	0.63	7	**237**	296	**161**	201	**77**	96	9	**1**	1.25
Maize flour	1	1	11,21	**1.62**	1,62	7	**1253**	1253	**1054**	1054	**199**	199	21	**0.29**	0.29
Mango	1	0.73	9	**1.5**	2.05	7	**2687**	3681	**1676**	2296	**16**	22	9	**0.21**	0.29
Mushroom[8]	1	0.98	22	**0,69**	0,70	22	**2420**	2469	/	/	/	/	22	**2.99**	3.05
Orange	1	0.8	9	**0.6**	0.75	7	**560**	700	**511**	639	**49**	61	9	**0.51**	0.64
Peach	1	0.91	9	**0.8**	0.88	7	**910**	1000	**771**	847	**139**	153	9	**0.43**	0.47
Peas (green)	1	0.31	11,20,23	**2.53**	8,16	7	**595**	1919	**445**	1435	**150**	484	17	**0.12**[9]	0.39
Pistachio	1	0.50	2,5	**3,79**	7,58	7	**11363**	22726	**10697**	21394	**666**	1332	5,8	**1.93**	3.86
Plum	1	0.9	9	**2.5**	2.78	7	**2180**	2422	**1758**	1953	**422**	469	9	**0.36**	0.40
Potato	1	0.83	16,24	**0,215**	0,26	7	**287**	346	**224**	270	**63**	76	25,26	**0.24**	0.29
Plums (dried)[10]	1	0.88	9	**13.08**	14.86	7	**11401**	14858	9194	10448	2207	2508	9	**1.88**	2.14
Quinoa	25	0.89	27	**2.55**[11]	2.87	28	**2188**	2458	/	/	/	/	29	**1.03**	1.16
Rice[12]	1,30	0.62-0.87	31	**1.56**[13]	2.52	7	**2497**[14]	2870	**2219**[8]	2551	**278**	320	25,26	**4.4**	5.06
Soybeans	1	0.88	20,21,23,32	**5.81**[15]	6.60	7	**2145**	2438	**2107**	2394	**37**	42	21	**0.23**	0.26
Tomato (ripe)	1	1	9	**0.4**	0.4	7	**214**	214	**171**	171	**43**	43	9	**0.05**	0.05
Walnut	1,2	0.34	2,33	**2.05**	6.03	7	**4918**	14465	**4104**	12071	**814**	2394	2	**1.29**	3.79
Wheat flour	1	1	21,23,24, 34,35	**3.31**	3.31	7	**1849**	1849	**1639**	1639	**210**	210	21,25,26	**0.88**	0.88
Wine[16]	1	1	9	**1.73**	1.73	7	**869**	869	**746**	746	**124**	124	9	**0.65**	0.65
Zucchini	1	1	16	**0.3**[4]	0.30	7	**362**	362	**267**	267	**95**	95	26	**2.3**[4]	2.36

The Table reports the edible part (e.p.), and the environmental parameters of standard amounts (in kg, or L) of vegetal foods (or drinks). The data are reported both for "raw" and e.p.-corrected food weight. The references are sequentially numbered and reported in the "*Ref.*" labelled columns. (See Supplementary Reference list). The environmental footprint of beer is not reported in Ref. 9.

Abbreviations: Bl & G: Blue & Green; corr.: corrected (for the edible part); GHGE: Green House Gas Emission; e.p.: edible part.

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[8] As *Pleurotus*.
[9] Derived from the data of dry peas in Table 1 (OSM Supplementary Ref. 29), recalculated for green peas using arbitrarily a ratio of 5.5 between the kcal of dry and green peas (Supplementary Ref. 1).
[10] Assuming a 5.23 ratio between fresh and dried prunes (calculated from their carbohydrate ratio).
[11] Average of 9 studied reported in (Supplementary Ref. 27) related to South America.
[12] The edible part value of rice, used for the calculation of corrected values of LU, was 62% to account for the recovery of edible rice from the plant (Supplementary Ref. 30). Conversely, the e.p. value used to calculate the correct values of WF and GHGE was 87% (Supplementary Ref. 1), because these "raw" values were referred to ready-to-be consumed rice.
[13] Referred to the consumable rice yield from the plant. To be corrected for the 62% e.p.
[14] As ready-to-use rice. To be corrected for a 87% e.p., according to (Supplementary Ref. 1).
[15] Average value from the Refs.
[16] Assuming a 1.43 ratio between fresh and dried grapes (calculated from their carbohydrate ratio).

Supplementary Table 3: The environmental footprint data of animal foods.

Animal foods	**Edible part**		**Land Use (LU)**			**Water Footprint (WF)**							**GHGE**		
	Ref.	**%**	*Ref.*	**m^2/kg**		*Ref.*	**L/kg**						*Ref.*	**Kg $CO_{2\text{-eq}}$/kg**	
							Total		*[Blue+Green]*		*Grey*				
				raw	corr.		raw	corr.	raw	corr.	raw	corr		raw	corr.
Bacon[1]	1	0.79	=pork	11.1	14.1	=pork	5225	6614	4537	5743	688	871	= pork	6.8	8.6
Beef[2]$_{extens.}$	1	1	37,38	224.3	224	43	21829	21829	21586	21586	243	243	9,37,38	48.70	48.7
Beef[2]$_{intens.}$			10,16,37-42	12.5	12.5		10244	10244	9532	9532	712	712	10,37-39	16.70	16.7
Bresaola [3]	1	1		18.1	18.1		14854	14854	13821	13821	1032	1032		24.22	24.2
Chicken$_{industr}$	1	0.98	10,16,42,38,44,45	7.8	8.0	43	2873	2932	2547	2600	326	332	10,37	3.80	3.9
Cod	46	0.39	47	0.0	0.1	48	700	1795	560	1436	140	359	10,17,47	5.52	10.26
Egg$_{industr}$	1	0.92	10,37,38,44,49	5.1	5.6	43	2872	3132	2503	2730	369	402	42	4.00	4.4
Gorgonzola[4]	1	1	=[milk*11], 50-54	15.4	15.4	=[milk*11]	11220	11220	10428	10428	792	792	=[milk*11]	16.5	16.5
Milk	1	1	16,37,38,1-54	1.4	1.4	43	1020	1020	948	948	72	72	38	1.50	1.5
Parmesan[5]	1	1	=[milk*13,5],55	18.9	18.9	43	13770	13770	12798	12798	972	972	=[milk*13,5]	20.25	20.3
Pork$_{industrial}$	1	0.79	16,43,44,56,57	11.1	14.1	43	5225	6614	4537	5743	688	871	26,37	6.80	8.6
Ricotta[6]		1	=[milk*5]	7.0	7.0	43	5100	5100	4740	4740	360	360	=[milk*5]	7.50	7.5
Seabass[7]$_{extens.}$	58,59	0.46	37,58	15.9	34.9	48	1150	2522	1080	2368	70	154	10,37	7.30	16.0
Seabass[8]$_{intens.}$				5.0	10.9		1150	2522	1080	2368	70	154		7.30	16.0
Turkey[9]	1	1	10,16,42,38,44,45	7.8	7.8	43	2873	2873	2547	2547	326	326	10,37	3.80	3.8
Yoghurt[10]	1	1	16,37,51-54	1.4	1.4	43	1020	1020	948	948	72	72	38	1.50	1.5

[1] The LU, WF and GHGE data of bacon are taken as the same of those of pork$_{industrial}$.
[2] The beef data have been subdivided between (semi)extensive, and (mixed)intensive systems (see references).
[3] The LU, WF and GHGE data of bresaola (a cured meat prepared from beef) were calculated by multiplying those of Beef $_{industrial}$ times the protein ratio (1.45/1) between bresaola and beef.
[4] Under the assumption that 11 liter milk are required for production of 1 Kg gorgonzola (Supplementary Reference 50).
[5] Under the assumption that 13.5 liter milk are required for production of 1 Kg parmesan (Supplementary Reference 55).
[6] Under the assumption that 5 liter milk are required for production of 1 Kg ricotta (Supplementary Reference 50).
[7] The seabass data have been subdivided between (semi)extensive and (mixed)intensive systems (see references). The GHGE data of seabass, in the absence of direct data for this fish, were arbitrarily calculated by averaging the cod and salmon data (Supplementary References 10 and 47).
[8] The LU data were those of organic production of fish in inland waters (Supplementary Reference 58).
[9] The LU, WF and GHGE data of turkey were taken as the same of those of chicken $_{industrial}$.
[10] Under the assumption that 1 liter milk is required for production of 1 Kg of yoghurt (Supplementary Reference 50).
assuming that the production of 1 kg of parmesan requires 13.5 L milk (Supplementary Reference 55).

Footnote to the Table:

The edible part (e.p.) of foods are expressed as % of raw weight (raw). Both raw and corrected (corr.) data for the e.p., are reported for Land use (LU), Total [Blue+Green] and Grey Water Footprint (WF), and Green House Gas Emission (GHGE). All data are referred to 1 Kg (or 1 Liter for milk) of animal foods.

Abbreviations: Bl & G: Blue & Green; corr.: corrected (for the edible part); extens.: (semi)extensive cultivation methods; GHGE: Green House Gas Emission; industr.: industrial methods; intens.: (semi)intensive methods; ref.: reference.

The references are sequentially numbered and reported in the “*Ref.*” labelled columns. (See the Supplementary Reference list).

Supplementary details of methods

Details on food composition of the meal combinations[1]

1. *Menu types and design*

We designed daily menus of three types, i.e. complying with either vegan (VEG), lacto-ovo-vegetarian (LO) or omnivorous (OMN) standards. For each menu type, seven different combinations were designed, with the purpose both to offer seven different daily choices for one week, and to allow statistical comparisons among menus.

The detailed composition of the menus is reported on Supplementary Table 1.

Each daily menu was composed of three main meals, an “extra food” (i.e. food item #7 of Supplementary Table 1) and of “additional food” items. The extra food, (either bread or potato, at the consumer’s choice), can be added at the reported amounts to any of the main meal. The “additional foods” consisted of fresh and dry fruit, extra virgin olive oil, lettuce, coffee and/or chocolate, added at approximately the same amounts in each of the three menu types (Supplementary Table 1).

The addition of both “extra” and “additional” foods, to those included in the main meals, was mainly determined by the need both to complete the spectrum of nutrient’s provision (mostly vitamins, salts, oligo elements, specific amino acids), and to match (by means of the food item #7 of Supplementary Table 1) the caloric intake among the menus, increasing it to a value closer to the recommended energy amount (Ref. 34 of the main text). As a matter of fact, the menus, initially based only on three main meals (complying with the EAAs RDAs, see below), resulted markedly hypocaloric (i.e. between ≈600 and ≈800 kcal/day, data not reported).

2. *Calculation of food amounts providing the RDAs of all the Essential Amino Acids (EAA)*

The basic approach of this study is that each daily menu was designed to provide the RDAs of all the essential amino acids for one day (Ref. 28 of the main text). Therefore, each food amount was titrated with the purpose to satisfy the requested amount of the “limiting” essential amino acid resulting from the food combinations, i.e. targeted to that EAA contained in the lowest amount in the menu. Consequently, all other EAAs resulted either at the same level, but usually in excess of, their RDAs.

To this aim, a spreadsheet was developed to finely titrate each food amount. The final estimate(s) of the food amounts were the result of an iterative process that considered a number of “constraints” (see the following paragraph).

3. *Food choice and Mediterranean Diet standards*

First, the foods were chosen and combined in each main meal on the basis of “common” choices and “reasonable” amounts, and according to the Mediterranean Diet indications.

[1] The References of this section are listed either within those of the Main text (when specifically indicated), or included in the Supplementary reference list of the Supplementary tables.

The general criteria in the food choice(s) were the following: 1) Their inclusion among the most frequently-used foods worldwide (Ref. 43 of the main text), but preferentially based on western countries customs and with a specific reference to Italy (Refs. 35-37 of the main textMS); 2) Their compliance with the Mediterranean Diet (MD) standards, as recently reviewed (Ref. 32 of the main text), further adapted to the recently-proposed Italian Mediterranean Index (Ref. 33 of the main text); 3) Following Italian common traditional recipes and proportions.

The Mediterranean Index by (Ref. 32 of the main text) is quantitatively based on the concept of "serving" (or portion), that notoriously varies among populations and national tradition. In order to quantitate food amounts in respect to Italian "servings", we relied on the values reported by the Italian Society of Huma Nutrition (SINU) (Ref. 60 of the main text). However, a number of (likely) minor conflicts are found between the above mentioned standards and the recently-updated MD criteria (Ref. 32 of the main text). As examples, in Agnoli's paper (Ref. 33 of the main text) the maximum suggested amount of combined red and processed meat is set at <70 g/day, whereas the MD weekly indications are of <2 portions of red meat (i.e. <200 g/week, or ≈30 g/day on average using the equivalence of 100 g for one meat portion by SINU) (Ref. 60 of the main text), as well as of 1 portion of processed meat (i.e. 50 g according to SINU's portions). In our study, we selected a value not greater than that suggested by the MD.

Similarly, in regard of white meat, we limited its amount to <2 portion/week (i.e. 200 g according to SINU's portions), as suggested by the MD. In regard to fish intake, no value is indicated in (Ref. 33 of the main text), whereas it is set at >2 portion per week by the MD (i.e. 300 g according to SINU) (Ref. 60 of the main text). In our study, we arbitrarily set fish intake in two OMN menus at 140 g per week. Another significant discrepancy between the MD indications (Ref. 32 of the main text) and Agnoli's Italian index (Ref. 33 of the main text) is that about potatoes, that are included within the starchy food daily intake of 1-2 portions at each main meal in the MD, whereas they are limited to <17 g/day in the latter. In our study, we relied on the suggested total intake by the MD of 1-2 portions of starchy-rich food (as the sum of pasta, rice, bread and potatoes) every main meal, that however is greater than that reported in (Ref. 33 of the main text). Our choice of the MD standards was aimed also at increasing the total energy content of the menus up to 1700-1800 kcal/day in a reference 70-kg subject, a value close to the theoretical requirement of 30-35 kcal/day in sedentary adult human beings of both sexes (Ref. 34 of the main text). As a matter of fact, it was very difficult to combine and to balance, among the menus, all the variables involved, i.e. the "minimum EAA" requirement, balanced and reliable amounts of the foods, and a sufficient energy provision. Therefore, although some of the proposed food quantities may be judged as subjective and somehow biased, these considerations and/or limitations in their assembly should be kept in mind.

4. *Additional Details on the food analytical composition and their assembly in the meals and menus.*

- Flour-derived foods: in the calculations involving wheat flour-derived bread and pasta, we estimated that flour is added to water so as to account for 65% of the final weight of bread (60), and for 88% of the final weight of dry pasta (61).

- Soy-based beverage (i.e. "soy drink"): The "soy drink" analytical composition was retrieved from (1), except for the amino acid data that are not reported in any of the databased utilized (Refs. 39-42 of the main text). Therefore, we indirectly calculated the amino acid content of "soy milk" from the soybean amino acid composition, by multiplying the latter by the ratio between the soy drink and soybeans total protein concentration (resulting to be 0.08).

The environmental footprint data of “soy milk” were retrieved from (62).

- Dates: the analytical composition of fresh dates (both fresh and dehydrated) were derived from CREA (1). The LU and GHGE environmental data of fresh dates were retrieved from (9), and those of the water footprint, from (7). The environmental footprint data of dehydrated dates were indirectly calculated from those of fresh dates, by multiplying the latter by the mean ratio of carbohydrates, protein, and energy, between dry and fresh dates (≈2/1) (Ref. 42 of the main text).

- Nuts: Different nut types were included either at breakfast or as a single food at dinner.

- Wine: To make 1 liter wine, we estimated the need of 1,43 kg grapes.

- Beer: Since no reliable environmental footprint data are available for beer (9), the environmental footprint associated to beeR was not considered in the calculations.

- Lettuce: The greater amounts of lettuce in the VEG than the other menus were used to match basically the lysine content (often the limiting EAA) among them.

Environmental parameters

The “land use” (LU), also defined a “land occupation” is the land surface required and/or used for the all the steps in the production of food (Refs. 8, 9, 11 of the main text). This parameter thus includes the original land surface used either to cultivate vegetables or to breed animals, as well as that used for all the associated requirements, such as production of fertilizers (for plants) and feed for animals, food packaging, storage and transportation, as well as the handling and/or the disposal of the waste or other by-products through the entire production chain) (Ref. 61 of the main text). In addition, land use may be grazing or feed lot dependent. Acreage needed for peas may be large but soil also enhancing. Animal waste can offer nitrogen but also harmful methane etc. (*For a deeper insight into these potential variables, see the pertinent reference to Supplementary Table 2 in the Supplementary Reference list*).

An additional complexity in the calculation of total LU, is that the use of land associated to the different steps in the food production chain may not take place in the same country or area, thus making virtually impossible to attribute to an unique site and/or producer the whole LU of a product. The GHGE is predominantly due to CO_2 production (i.e. the most relevant anthropogenic Green-House-Gas (Ref. 51 of the main text), released into the atmosphere over the entire food production process (Refs. 9-11 of the main text). It includes both the CO_2 production itself (representing the major portion), and that of other gases (methane, nitrous dioxide), comprehensively defined as the CO_2-equivalent (gas) production (CO_2-eq). The GHGE data of the foods were retrieved from the References listed in the Supplemental material.

The Water Footprint (WF) is the water volume used through the whole food production process. It is the sum of three main components, i.e. the green, blue and grey ones (Refs. 27-29 of the main text). The green WF corresponds to the rainwater consumed, evaporated or incorporated into the product. The blue WF refers to surface and groundwater volumes consumed. The grey WF refers to the volume of fresh water needed to dilute pollutants and restore the water reserve, given natural background concentrations and existing ambient water quality standards. A precise estimate of the water foot print (either of the total one or that of its components) is difficult because of a variety of reasons. First, the efficiency of water use can vary greatly, depending on the location and the type of cultivation, the soil type, the microclimate and many other factors. Furthermore, the impact on the grey WF component by the food technological treatments, storage, cooking, and other procedures, is not always taken into consideration (Refs. 29, 30 of the main text). Therefore, reported WF values are often difficult to be compared among different authors and properly handled, and may sometimes appear unrealistic. Furthermore, researchers (as ourselves) may use values estimated by others. Another source of variation is that derived from the LCA methodology itself, that, particularly in the case of animal foods, must include also the water consumed for feed production (43) (and Ref. 61 of the main text). It is well known that most of the water used for animal food production occurs in the growing of feed, and the site where feed is produced can be different and wide apart from that of animal growing itself, making difficult to establish a spatial relationship between feed and animal production (Refs. 29 and 30 of the main text).

The WF data were largely retrieved from two reports of the same authors (9, 43), who on turn applied complex models in their calculation also based on many published studies from other investigators. The separate components of total WF were used, as far as they were available. For instance, these separate data were not available for either the extensive or the intensive seabass cultivations, likely because the reported water values included also that used to wash out the cultivation field (See Supplementary Table 2).

Life Cycle Assessment (LCA)

The LCA approach considers several factors associated to each environmental parameter, and is complicated by large inter-regional differences in the product yield, as well as by variable interrelationships among the factors themselves (Ref. 61 of the main text). These factors include the animal species, nutritional requirements, breeding methods, the nutritive value of the feeds employed, the geographical area, the production techniques utilized, the agricultural yield of the feed ingredients, etc. These factors are particularly variable for beef meat and fish production. As examples, estimates of land use for beef meat production may vary from an minimum of ≈7 to a maximum of ≈420 m^2/kg of edible meat, largely depending on the animal feed choice/production, and the breeding systems adopted, i.e. (semi)intensive vs. extensive/grazing (37, 38). Similarly, the land use for fish may vary from ≈4 to ≈17 m^2/kg of land use, again depending on either (semi)intensive or free-living environments, respectively, as well as on the fishing systems (37, 58). The same considerations hold for the Green House Gas Emission (GHGE) parameters (37, 38). Although we calculated the LU and GHGE of these two food types, by applying both (semi)intensive and extensive values (See Supplementary Table 2), in this study we arbitrarily chose to use the (semi)intensive system data for both beef and seabass-containing meals (See the Discussion of the main text for detailed explanations).

It should also be considered that a “black and white” discrimination between these two quite opposite systems, appear somehow inappropriate and/or unrealistic. As an example, while extensive, grazing systems for animal breeding objectively are associated to greater LU and of GHGE than intensive ones, they nevertheless allow the utilization of land otherwise unusable for any other purposes. Conversely, intensive and (semi)-intensive systems, if properly applied taking into consideration animal welfare too (Refs. 55 and 56 of the main MS), may represent a way to achieve high-throughput, optimized and controlled food production while minimizing the environmental impact. Therefore, as regards the environmental footprint of cow and fish (seabass), we arbitrarily decided to use for calculation only the data derived from (semi)intensive systems.

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