Public perceptions of how to reduce carbon footprints of consumer food choices

-Supplementary Materials-

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This file includes:

Tables S1 to S11
Table S1. Questions that asked participants to generate rules for identifying food with a low carbon footprint.

Produce

Imagine that you are shopping for produce with a low carbon footprint.

Those may include:

- 1 kg onions, leek or shallots
- 1 kg of apples
- 1 kg carrots
- 1 kg tomatoes
- Lettuce (1 head)
- 1 kg of bananas
- 1 pack of mushrooms (300 g)
- 1 head of cabbage (800 g)
- 1 kg of potatoes
- 500 g of strawberries
- 1 kg of oranges

What characteristics do you think are typical for produce with a low carbon footprint?

Please list as many characteristics as you can think of. Please use a separate line for each.

________________ [15 lines]
Dairy

Imagine that you are shopping for dairy products (and their plant-based alternatives) with a low carbon footprint.

Those may include:

- 1 l whole milk
- 250 g natural cheese
- 1 kg sweetened yoghurt
- 150 g cream cheese
- 1 kg natural yogurt
- 250 g cream
- 200 ml condensed milk
- 250 g mozzarella
- 1 l semi-skimmed milk
- 1 l of soy milk

What characteristics do you think are typical for dairy products (and plant-based alternatives) with a low carbon footprint? Please list as many characteristics as you can think of. Please use a separate line for each.

________________ [15 lines]
*Protein-rich products*

Imagine that you are shopping for protein products (like meat, fish and their plant-based alternatives) with a low carbon footprint.

Those may include:

- 250 g lamb
- 200 g tofu
- 1 chicken (1.5 kg)
- 450 g pork steaks
- 350 g diced beef
- 500 g minced pork
- 280 g (2 pieces) salmon filet
- 180 g prawns
- 230 g marinated herring
- 300 g minced quorn

What characteristics do you think are typical for protein products with a low carbon footprint? Please list as many characteristics as you can think of. Please use a separate line for each.

__________________ [15 lines]

*Note:* The carbon footprint of products in a food group was defined as “all of the greenhouse gases such as CO₂ that are released in producing it and getting it into your shopping basket.”
Each generated rule generated was then evaluated regarding informativeness, on a 7-point Likert scale ranging from (1) “not informative at all” – (7) “very informative” by asking “How informative do you think is each characteristic regarding the carbon footprint of produce [dairy and dairy alternatives/protein products]?”
Table S2. Questions that asked participants to evaluate pre-selected rules about reductions in food-related carbon footprints.

How many grams of greenhouse gases such as CO₂ do you think are SAVED by the following changes?

Please try to make your best guess, even if it is hard.

Please enter whole numbers only. Do not use decimals, ranges, percent signs, or text.

**Produce**

- growing 1 kg of produce on a field outside instead of in a heated greenhouse?
- producing 1 kg of produce organically instead of conventionally?
- producing 1 kg of produce locally rather than importing it from another European country?
- packing 1 kg of produce into a paper bag instead of into a plastic shell?

**Dairy**

- producing 1 kg of plant-based margarine instead of 1 kg of butter?
- producing 1 l of soy milk instead of 1 l of conventional milk?
- producing 1 l of organic milk instead of 1 l of conventional milk?
- producing 1 l of milk locally (within, the same county, i.e. approximately a 50 miles radius) instead of importing it from a different region of the UK (400 miles radius)?

**Protein-rich products**

- producing 1 kg of fresh fish instead of 1 kg of fresh beef
- producing 1 kg of chicken instead of 1 kg of pork?
• producing 1 kg of organic meat instead of 1 kg of conventional meat?

• producing 1 kg of meat in the UK instead of importing it from a European country?

Note: Participants typed their answer into a textbox, preceded by “gram [percent] saved:”. Participants then answered how confident they were about each of their estimates: “How confident are you about your answer above?” on a 7-point Likert scale, ranging from (1) “not confident at all” – (7) “very confident”.
Table S3. Demographic characteristics, environmental worldview, climate change knowledge, numeracy and need for cognition, of participants who completed all relevant questions vs not, as well as the UK population.

| Characteristic                        | Participants who completed all questions (N = 627) | Participants who did not complete all questions (N=106) | UK population |
|--------------------------------------|--------------------------------------------------|----------------------------------------------------------|---------------|
| Age Mean (SD)                        | 43.00 (15.00)                                    | 38 (19)                                                  | Median = 40   |
|                                      | Median = 40                                      |                                                          | [Q_{25%} = 21.1, Q_{75%} = 58.3] |
|                                      | [Q_{25%} = 32, Q_{75%} = 55]                    |                                                          |               |
| % male                               | 41                                               | 42                                                       | 49            |
| % College degree or higher           | 57                                               | 43                                                       | 27            |
| Environmental worldview Mean (SD)    | 4.72 (0.78)                                      | 4.35 (0.66)                                              | Not available |
| Climate change knowledge Mean (SD)   | 39% (0.92)                                       | 0.29 (0.22)                                              | Not available |
| Numeracy Mean (SD)                   | 1.60 (0.97)                                      | 1.42 (0.87)                                              | 2.6 (1.13)    |
| Need for cognition Mean (SD)         | M = 0.40 (0.92)                                  | 0.11 (0.65)                                              | M = 3.40 (.58) |

Note. The mean value for climate change knowledge reflects the proportion of correct answers across all scale items for each participant. Age and gender data for the general UK population were derived from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/february2016; accessed on June 4th 2018.

Education data were obtained from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuskeystatisticsforenglandandwales/2012-12-11#qualifications; accessed on June 4th 2018. Numeracy values for the UK population were obtained from²⁰. Participants were randomly allocated into 6 experimental groups, following a 3 (food group: Produce vs dairy vs protein-rich products) x 2 (numerical format: grams of GHG emissions vs percentage reduction)-study design. Variables reported in this table were similar across these groups (all p’s > .20).
Table S4. Literature references to life cycle analyses from climate and environmental sciences, estimating GHG emissions reductions associated with each rule generated by participants. See Figure 1 for GHG emission reductions associated with each rule.

| Rank | A. Produce |
|------|------------|
| Rule                                      | Reference                     |
| 1    | No airfreight transportation (truck) | Stoessel et al. 2012          |
| 2    | Grown outdoors (no greenhouse)      | Clune et al. 2017             |
| 3    | Buy seasonal                         | Röös & Karlsson 2013          |
| 4    | Buy fresh (e.g. not frozen)          | Grabolle & Loitz 2007         |
| 5    | Produce organic                      | Aguilera et al. 2015          |
| 6    | Produce local (non-EU, truck)        | Stoessel et al. 2012          |
| 7    | Reduce packaging (paper bag instead of plastic) | Clune et al 2017; Grabolle & Loitz 2007 |
| 8    | Eat homegrown produce                | NA                            |
| 9    | Low processing energy                | NA                            |
| 10   | Other                                 | NA                            |
| 11   | Buy high quality                     | NA                            |
| 12   | Buy healthy food                     | NA                            |
| 13   | Buy food with good taste             | NA                            |
| 14   | Buy low price products               | NA                            |

Note. Ranks in the first column reflect the strength of association for food-related carbon footprints in the produce food group. Rules in bold refer to references we used for assessing Mean Absolute Deviations (MADs) for answering Research Question 2b. NA = Not applicable: We were not able to identify life cycle analyses providing precise GHG emission estimates for these rules.
| Rank | B. Dairy                                                                 | Reference                                                                 |
|------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1    | Replace dairy by plant-based alternatives (margarine instead of butter) | Nilsson et al. (2010)                                                   |
| 1*   | Replace dairy by plant-based alternatives (soy milk instead of milk)    | Clune et al. 2017                                                       |
| 2    | Reduce fat content                                                       | Clune et al. 2017                                                       |
| 3    | Produce non-sweetened product                                            | Clune et al. 2017                                                       |
| 4    | Buy fresh instead of UHT (example for milk)                             | Clune et al. 2017; Gonzales-Garcia et al 2013                           |
| 5    | Buy organic (example for milk)                                          | Thomassen et al. 2007                                                   |
| 6    | Buy local (50 instead of 400 miles radius)                              | Clune et al. 2017; Edward-Jones et al., 2008                            |
| 7    | Reduce packaging (plastic instead of glass)                             | Grabolle & Loitz 2007; [http://foodplastics.com.au/Products/Bottles/1L%20LW%20Bottle.aspx](http://foodplastics.com.au/Products/Bottles/1L%20LW%20Bottle.aspx) |
| 8    | Low processing energy                                                   | NA                                                                      |
| 9    | Buy free range                                                          | NA                                                                      |
| 10   | Other                                                                   | NA                                                                      |
| 11   | Buy high quality                                                        | NA                                                                      |
| 12   | Buy healthy food                                                        | NA                                                                      |
| 13   | Buy food with good taste                                                | NA                                                                      |
| 14   | Buy low price products                                                  | NA                                                                      |

**Note.** Ranks in the first column reflect the strength of association for food-related carbon footprints in the dairy food group. Rules in bold refer to references used for assessing actual numerical estimates for assessing Mean Absolute Deviations (MADs) for answering research Question 2b. **NA** = Not applicable: We were not able to identify life cycle analyses providing precise GHG emission estimates for these rules.
| Rank | C. Protein-rich products |
|------|-------------------------|
| Rule | Reference               |
| 1    | Replace animal-based with plant-based protein-rich products (example for beef/quorn) | Clune et al. 2017 |
| 2    | **Buy fish instead of meat (example for beef)** | Clune et al. 2017 |
| 3    | Buy white instead of red meat (e.g. chicken instead of beef) | Clune et al. 2017 |
| 3*   | **Buy chicken instead of pork** | Clune et al. 2017 |
| 4    | Buy organic | Clune et al. 2017; Grabolle & Loitz 2007 |
| 5    | Buy fresh (not deep frozen) | Grabolle & Loitz 2007 |
| 6    | **Buy local (pork, non-EU)** | Clune et al 2017; Edward-Jones et al., 2008 |
| 7    | Reduce packaging | Grabolle & Loitz 2007 |
| 8    | Low processing energy | NA |
| 9    | Buy free range | NA |
| 10   | Other | NA |
| 11   | Buy high quality | NA |
| 12   | Buy healthy food | NA |
| 13   | Buy food with good taste | NA |
| 14   | Buy low price products | NA |

*Note. Ranks in the first column reflect the strength of association for carbon footprints of protein-rich foods. Rules in bold refer to references used for assessing actual numerical estimates for assessing Mean Absolute Deviations (MADs) for answering Research Question 2b. NA = Not applicable: We were not able to identify life cycle analyses providing precise GHG emission estimates for these rules.
| Research Question                                                                                                                                  | Analysis                                                                                                                                                                                                                                                                                                                                 | Results                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1a. How many rules did participants generate for identifying produce, dairy, or protein-rich products with a low carbon footprint?                   | Number of rules per participant was analyzed in a set of linear regression models with different predictors. A simple model included only food group (Produce/ Dairy/ Protein-rich products), and an extended model the four individual-difference variables (environmental worldviews, climate change knowledge, numeracy, need for cognition) as main effects as well as age, gender and education as control variables. Interactions with individual-difference variables were analyzed in a set of four additional models. These separately included 2-way interactions between food group and one of these variables, as well as the variables from the extended model. | Tables S6.A. and S6.B.                                                                               |
| 1b. What percent of participants generated the most effective rules for identifying produce, dairy, or protein-rich products with a low carbon footprint (as identified in existing life cycle analyses from climate and environmental sciences)? | The percentage of participants successfully identifying each rule was specified in a variable that reflected whether participants identified the most effective rule, for each food group, and subjectively rated it as the most effective (“informative”) rule, compared to other generated rules (1=yes, 0=no). Participants who mentioned the most effective rule were coded as 1. This variable was analyzed in a similar set of logistic regression models. A simple logistic regression model included only food group (Produce/ Dairy/ Protein-rich products), and an extended model the main effects of the four individual-difference variables (environmental worldviews, climate change knowledge, numeracy, need for cognition) as well as age, gender and education as control variables. Interactions with individual-difference variables were analyzed in a set of four additional models. These separately included 2-way interactions between food group and one of these variables, as well as the variables from the extended model. | Tables S7.A. and S7.B. (Auxiliary analysis in Tables S8.A. and S8.B.)                                  |
need for cognition) as main effects. The extended model further controlled for age, gender and education. Interactions with individual-difference variables were assessed in a set of four additional models. These separately included 2-way interactions between food group and one of these variables, as well as the variables from the extended model.

In an auxiliary analysis, effectiveness of generated rules was additionally explored by summing up the GHG emissions associated with each generated rule according to life cycle analyses (Table S4), for each participant. These sums were analyzed in a similar set of linear regression models.

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2. How accurate were participants when estimating reductions in GHG emissions for pre-selected rules, in grams vs. percentages (as compared to life cycle analyses from climate and environmental sciences)?

Mean absolute deviations of participants’ estimates from estimates in life cycle analyses from climate and environmental sciences (Table S4) were analyzed in several multilevel linear regression models with different predictors. In those models, mean absolute deviations from four estimation questions were nested into each participant. Intercepts were allowed to randomly vary for each participant. A simple model included only numerical format (gram versus percent), and an extended model additionally the main effects of the four variables measuring individual-difference variables (environmental worldview, climate change knowledge, numeracy, need for cognition) as main effects. The extended model further controlled for age, gender and education. Interactions with individual-difference variables was analyzed in a set of four additional models. These

Tables S9.A and S9.B. (Auxiliary analyses in Tables S10.A and S10.B. and Tables S11.A and S11.B.)
separately included 2-way interactions between food group and one of these variables, format and one of these variables, as well as the variables from the extended model. Auxiliary analyses were conducted on participants’ confidence into their estimates and frequency of missing answers (pooled for each participant). These were analyzed with a similar set of simple linear regression models.
Table S6.A. Linear regressions, predicting number of rules generated by each participant (N = 627).

| Coefficient                        | Model 1     |         |         |         |         |         |         |         |         |         |         |
|------------------------------------|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                                    | B (SE)      | t       | p       | 95% Confidence Interval | B (SE)      | t       | p       | 95% Confidence Interval |
| Dairy (vs. Produce)                | -0.06 (0.12)| -0.15   | .63     | -0.29   | 0.18     | -0.11 (0.11)| -1.01  | .31     | -0.32   | 0.10    |
| Protein-rich products (vs. Produce)| -0.23 (0.12)| -1.95   | .05     | -0.46   | 0.001    | -0.30 (0.11)| -2.71  | .01     | -0.51   | -0.08   |
| Individual-difference variables    |             |         |         |         |         |         |         |         |         |         |         |
| Environmental worldview            |             |         |         |         |         |         |         |         |         |         |         |
|                                   | 0.12 (0.06) | 1.96    | .05     | -0.0003 | 0.25     |
| Climate change knowledge           |             |         |         |         |         |         |         |         |         |         |         |
|                                   | 1.78 (0.29) | 6.22    | <.001   | 1.22    | 2.34     |
| Numeracy                           |             |         |         |         |         |         |         |         |         |         |         |
|                                   | 0.20 (0.05) | 4.19    | <.001   | 0.11    | 0.30     |
| Need for cognition                 |             |         |         |         |         |         |         |         |         |         |         |
|                                   | 0.11 (0.05) | 2.16    | .03     | 0.01    | 0.21     |
| Control variables                  |             |         |         |         |         |         |         |         |         |         |         |
| Age                                | 0.002 (0.003)| 0.72    | .48     | -0.004  | 0.01     |
| Male                               | -0.11 (0.09)| -1.16   | .25     | -0.29   | 0.008    |
| Education                          | 0.07 (0.09) | 0.77    | .25     | -0.11   | 0.26     |
| Intercept                          | 1.61 (0.08) | 19.22   | <.001   | 1.45    | 1.77     |
| BIC                                | 2045        |         |         |         |         |         |         |         |         |         |         |
| R²                                 | 0.003       |         |         |         |         |         |         |         |         |         | 0.17    |
Table S6.B. Coefficient estimates for two way-interactions between food group and individual-difference variables in four additional models predicting number of rules generated by each participant. Interactions were included separately into each model.

| Model 3 |                | B (SE)  | t      | p     | 95% Confidence Interval | BIC  | R² |
|---------|----------------|---------|--------|-------|-------------------------|------|----|
| Dairy (vs. Produce) x Environmental worldview |                | -0.22 (0.14) | -1.56 | .12   | -0.49 - 0.06           | 1967 | .17|
| Protein-rich products (vs. Produce) x Environmental worldview |                | -0.12 (0.14) | -0.83 | .41   | -0.39 - 0.06           |      |    |

| Model 4 |                |         |        |       |                        |      |    |
|---------|----------------|---------|--------|-------|------------------------|------|----|
| Dairy (vs. Produce) x Climate change knowledge |                | -1.04 (0.62) | -1.69 | .09   | -2.26 - 0.17           | 1974 | .18|
| Protein-rich products (vs. Produce) x Climate change knowledge |                | -1.13 (0.60) | -1.89 | .06   | -2.30 - 0.05           |      |    |

| Model 5 |                |         |        |       |                        |      |    |
|---------|----------------|---------|--------|-------|------------------------|------|----|
| Dairy (vs. Produce) x Numeracy |                | -0.16 (0.12) | -1.34 | .18   | -0.39 - 0.07           | 1976 | .17|
| Protein-rich products (vs. Produce) x Numeracy |                | -0.11 (0.11) | -1.04 | .30   | -0.33 - 0.03           |      |    |

| Model 6 |                |         |        |       |                        |      |    |
|---------|----------------|---------|--------|-------|------------------------|------|----|
| Dairy (vs. Produce) x Need for cognition |                | 0.02 (0.12) | 0.15  | .88   | -0.22 - 0.25           | 1978 | .17|
| Protein-rich products (vs. Produce) x Need for cognition |                | 0.04 (0.12) | 0.37  | .71   | -0.19 - 0.27           |      |    |

Note. All other predictors included in models 3-6 were similar to model 2.
Table S7.A. Logistic regression, predicting if participants successfully identified the most effective rule for each food group (N = 627).

| Coefficient                        | Model 1                  | Model 2                  |
|------------------------------------|--------------------------|--------------------------|
|                                    | B (SE)                   | z            | p     | 95% Confidence Interval | B (SE) | z   | p     | 95% Confidence Interval |
| Dairy (vs. Produce)                | -0.22 (0.48)             | -0.46        | .65   | -1.20 | 0.73 | -0.31 (0.50) | -0.62 | .54   | -1.31 | 0.67 |
| Protein-rich products (vs. Produce)| 0.57 (0.41)              | 1.39         | .16   | -0.22 | 1.41 | 0.64 (0.43) | 1.50  | .13   | -0.18 | 1.50 |
| Individual-difference variables    |                          |               |       |       |      |               |       |       |       |     |
| Environmental worldview            |                          |               |       |       |      |               |       |       |       |     |
| Climate change knowledge           | 0.003 (1.23)             | 0            | .99   | -2.36 | 2.48 |
| Numeracy                           | 0.02 (0.18)              | 0.12         | .90   | -0.36 | 0.37 |
| Need for cognition                 | 0.19 (0.20)              | 0.93         | .35   | -0.20 | 0.58 |
| Control variables                  |                          |               |       |       |      |               |       |       |       |     |
| Age                                | 0.04 (0.01)              | 2.90         | .004  | 0.01  | 0.06 |
| Male                               | -0.28 (0.39)             | -0.72        | .47   | -1.08 | 0.47 |
| Education                          | 1.17 (0.44)              | 2.63         | .09   | 0.34  | 2.09 |
| Intercept                          | -3.00 (0.32)             | -9.25        | <.001 | -3.70 | -2.24 | -6.78 (1.38) | -4.92 | <.001 | -9.58 | -4.16 |
| BIC                                | 285                      |               |       |       |      | 309          |       |       |       |     |
| $R^2$ Nagelkerke                   | .02                      |               |       |       |      | .11          |       |       |       |     |

Note. 1 indicates that participants generated the most effective rule according to life cycle analyses (also if they generated only a single rule), and subjectively rated it as more effective, compared to other generated rules, 0 indicated that it wasn’t generated at all or rated as less effective than other rules.
Table S7.B. Coefficient estimates obtained from four additional logistic regression models, each including the two way-interaction between food group and the individual-difference variables predicting if participants successfully identified the most effective rule for each food group. Interactions were included separately into each model.

| Coefficient |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|
|             | B (SE)   | z        | p        | 95% Confidence Interval | BIC | \( R^2_{\text{Nagelkerke}} \) |
| **Model 3** |          |          |          |          |          |
| Dairy (vs. Produce) x Environmental worldview | 0.52 (0.66) | -0.79 | .43 | -1.87 | 0.73 | 319 | .13 |
| Protein-rich products (vs. Produce) x Environmental worldview | 0.47 (0.52) | 0.91 | .63 | -0.56 | 1.48 |          |          |
| **Model 4** |          |          |          |          |          |
| Dairy (vs. Produce) x Climate change knowledge | -9.18 (3.27) | -2.81 | .01 | -15.96 | -3.04 | 313 | .15 |
| Protein-rich products (vs. Produce) x Climate change knowledge | -5.79 (3.05) | -1.90 | .06 | -12.15 | -0.10 |          |          |
| **Model 5** |          |          |          |          |          |
| Dairy (vs. Produce) x Numeracy | 0.25 (0.63) | 0.40 | .69 | -1.06 | 1.58 | 318 | .13 |
| Protein-rich products (vs. Produce) x Numeracy | 0.81 (0.49) | 1.66 | .10 | -0.05 | 1.96 |          |          |
| **Model 6** |          |          |          |          |          |
| Dairy (vs. Produce) x Need for cognition | -0.84 (0.53) | -1.58 | .11 | -1.90 | 0.19 | 319 | .13 |
| Protein-rich products (vs. Produce) x Need for cognition | -0.25 (0.42) | -0.60 | .55 | -1.09 | 0.58 |          |          |

*Note.* All other predictors included in models 3-6 were similar to model 2.
**Table S8.A.** Linear regressions, predicting reductions of GHG emissions associated with rules generated by each participant (in grams of GHG emissions, according to estimates derived from life cycle analyses from climate and environmental sciences; \(N = 627\)).

| Coefficient | Model 1 | | Model 2 | |
|-------------|---------|---|---------|---|
| | \(B\) (SE) | \(t\) | \(p\) | 95% Confidence Interval | \(B\) (SE) | \(t\) | \(p\) | 95% Confidence Interval |
| Dairy (vs. Produce) | 171.80 (704.48) | 0.24 | .81 | -1211.63 1555.23 | 133.21 (701.95) | 0.19 | .85 | -1245.28 1511.70 |
| Protein-rich products (vs. Produce) | 4400.67 (704.46) | 6.25 | <.001 | 3018.91 5782.44 | 4392.97 (705.52) | 6.23 | <.001 | 3007.44 5778.49 |
| Individual-difference variables | | | | | | | | |
| Environmental worldview | | | | | | | | |
| Climate change knowledge | | | | | | | | |
| Numeracy | | | | | | | | |
| Need for cognition | | | | | | | | |
| Control variables | | | | | | | | |
| Age | 38.38 (20.40) | 1.89 | .06 | -1.56 | 78.33 |
| Male | 538.21 (609.65) | 0.88 | .38 | -659.03 | 1735.45 |
| Education | 820.26 (613.30) | 1.34 | .18 | -384.15 | 2024.66 |
| Intercept | 940.01 (496.94) | 1.89 | .06 | -36 | 1915.97 | -2.74 | .02 | -9728.89 | -1609.41 |
| BIC | 12940 | | | | 12970 | | |
| \(R^2\) | .07 | | | | .08 | | |

**Note.** Effectiveness was operationalized as sum of GHG emissions reductions associated with all rules generated by each participant, reflecting the influence of rules on carbon footprints according to life cycle analyses from climate and environmental sciences (Table 1; Figure 2).
Table S8.B. Coefficient estimates obtained from four additional models, each including the two way-interaction between food group and the individual-difference variables predicting average reductions associated with generated rules. Interactions were included separately into each model.

| Model | Interaction | B (SE)       | t   | p     | 95% Confidence Interval | BIC   | R²  |
|-------|-------------|--------------|-----|-------|-------------------------|-------|-----|
|       | Dairy (vs. Produce) x Environmental worldview | -386.04 (895.90) | -0.43 | .67   | -2145.42                | 1373.35 | 12967 | .09 |
|       | Protein-rich products (vs. Produce) x Environmental worldview | 1706.76 (897.26) | 1.90 | .06   | -55.30                  | 3468.82 |       |     |
|       | Dairy (vs. Produce) x Climate change knowledge | -5672.26 (3994.08) | -1.42 | .16   | -13515.96               | 2171.44 | 12978 | .09 |
|       | Protein-rich products (vs. Produce) x Climate change knowledge | 3112.33 (3864.53) | 0.81 | .42   | -4476.95                | 10701.61 |       |     |
|       | Dairy (vs. Produce) x Numeracy | -4.32 (763.84) | -0.01 | 1     | -1504.37                | 1495.73 | 12980 | .08 |
|       | Protein-rich products (vs. Produce) x Numeracy | 906.04 (709.91) | 1.28 | .20   | -488.10                 | 2300.18 |       |     |
|       | Dairy (vs. Produce) x Need for cognition | -332.60 (778.19) | -0.43 | .67   | -1860.83                | 1195.63 | 12981 | .08 |
|       | Protein-rich products (vs. Produce) x Need for cognition | 504.38 (759.71) | 0.66 | .51   | -978.55                 | 1996.31 |       |     |

Note. All other predictors included in models 3-6 were similar to model 2.
Table S9.A. Multivariate regressions, predicting mean absolute deviations of participants’ numerical estimates from GHG emission values obtained in life cycle analysis associated with four rules for each food group (N = 2508 estimates).

| Coefficient | Model 1 | | | | Model 2 | | | |
|-------------|---------|-----------------|-----------------|---------|-----------------|-----------------|---------|-----------------|-----------------|---------|-----------------|-----------------|---------|
|             | $B$ (SE) | $t$ | $p$ | 95% Confidence Interval | $B$ (SE) | $t$ | $p$ | 95% Confidence Interval |
| Format (gram vs. percent) | -0.87 (0.05) | -18.65 | <.001 | -0.96 | -0.78 | -0.86 (0.04) | -22.72 | <.001 | -0.93 | -0.79 |
| Dairy (vs. Produce) | 0.32 (0.05) | 6.80 | <.001 | 0.23 | 0.41 |
| Protein-rich products (vs. Produce) | 1.09 (0.05) | 23.42 | <.001 | 1.00 | 1.18 |
| Individual-difference variables | | | | | | | | | | | | | |
| Environmental worldview | 0.02 (0.03) | 0.89 | .37 | -0.03 | 0.08 |
| Climate change knowledge | 0.10 (0.12) | 0.78 | .44 | -0.14 | 0.33 |
| Numeracy | 0.01 (0.01) | 0.59 | .56 | -0.03 | 0.05 |
| Need for cognition | 0.03 (0.02) | 1.15 | .25 | -0.02 | 0.07 |
| Control variables | | | | | | | | | | | | | |
| Age | -0.001 (0.001) | -1.06 | .29 | -0.004 | 0.001 |
| Male | 0.002 (0.04) | 0.04 | .97 | -0.08 | 0.08 |
| Education | 0.02 (0.04) | 0.43 | .67 | -0.06 | 0.10 |
| Intercept | 2.73 (0.03) | 81.89 | <.001 | 2.66 | 2.79 | 2.12 (0.14) | 15.35 | <.001 | 1.85 | 2.39 |

BIC
Model 1: 7216
Model 2: 6818

Note. We predicted mean absolute deviations from life cycle analysis values as a function of Format (coded as gram = 0, percent = 1), food group, individual-difference variables and control variables. Intercepts were allowed to randomly vary for each participant. Base-10 logarithmic transformations were applied to absolute deviations because the distribution was significantly different from 0 (Shapiro Wilk-Test: $p < .001$). Spearman rank correlations indicated no association between participants’ estimates and GHG emission values according to life cycle analyses in the grams condition ($r = -0.04, p = .25$). In the percent condition, correlations between estimates and values from life cycle analyses from climate and environmental sciences were higher ($r = 0.73, p < .001$). Correlations were based on log-10 transformed values.
Table S9.B. Coefficient estimates obtained from four multivariate regression models, each additionally including two way-interactions between format and food group and the individual-difference variables, predicting mean absolute deviations of participants’ numerical estimates from GHG emission values obtained in life cycle analysis associated with four rules for each food group (N = 2508 estimates).

| Model 3                                                                 | B (SE) | t    | p   | 95% Confidence Interval | BIC  |
|-----------------------------------------------------------------------|--------|------|-----|-------------------------|------|
| Format (gram vs. percent) x Environmental worldview                  | 0.04 (0.05) | 0.82 | .41 | -0.06                   | 0.14  | 6850 |
| Dairy (vs. Produce) x Environmental worldview                        | -0.08 (0.06) | -1.38 | .17 | -0.20                   | 0.03  |     |
| Protein-rich products (vs. Produce) x Environmental worldview        | 0.01 (0.06) | 0.11 | .91 | -0.11                   | 0.12  |     |

| Model 4                                                                 | B (SE) | t    | p   | 95% Confidence Interval | BIC  |
|-----------------------------------------------------------------------|--------|------|-----|-------------------------|------|
| Format (gram vs. percent) x Climate change knowledge                  | 0.16 (0.22) | 0.73 | .47 | -0.27                   | 0.58  | 6843 |
| Dairy (vs. Produce) x Climate change knowledge                       | 0.16 (0.27) | 0.62 | .54 | -0.36                   | 0.68  |     |
| Protein-rich products (vs. Produce) x Climate change knowledge        | 0.29 (0.26) | 1.13 | .26 | -0.21                   | 0.80  |     |

| Model 5                                                                 | B (SE) | t    | p   | 95% Confidence Interval | BIC  |
|-----------------------------------------------------------------------|--------|------|-----|-------------------------|------|
| Format (gram vs. percent) x Numeracy                                 | 0.02 (0.04) | 0.50 | .62 | -0.06                   | 0.10  | 6855 |
| Dairy (vs. Produce) x Numeracy                                       | 0.01 (0.05) | 0.09 | .93 | -0.09                   | 0.10  |     |
| Protein-rich products (vs. Produce) x Numeracy                       | -0.01 (0.05) | -0.25 | .80 | -0.10                   | 0.08  |     |

| Model 6                                                                 | B (SE) | t    | p   | 95% Confidence Interval | BIC  |
|-----------------------------------------------------------------------|--------|------|-----|-------------------------|------|
| Format (gram vs. percent) x Need for cognition                        | 0.06 (0.04) | 1.30 | .19 | -0.03                   | 0.14  | 6852 |
| Dairy (vs. Produce) x Need for cognition                              | -0.02 (0.05) | -0.40 | .69 | -0.12                   | 0.08  |     |
| Protein-rich products (vs. Produce) x Need for cognition              | 0.04 (0.05) | 0.82 | .43 | -0.06                   | 0.14  |     |
Table S10.A. Linear regression, predicting participants’ average confidence into estimates, made in two different formats (gram versus percent change of GHG emissions reductions; N = 510).

| Coefficient                                | B (SE)       | t    | p    | 95% Confidence Interval | B (SE)       | t    | p    | 95% Confidence Interval |
|--------------------------------------------|--------------|------|------|--------------------------|--------------|------|------|--------------------------|
| Format (gram vs. percent)                  | 0.13 (0.02)  | 5.22 | <.001| 0.08 0.18                | 0.12 (0.03)  | 4.63 | <.001| 0.07 0.17                |
| Dairy (vs. Produce)                        | -0.02 (0.03) | -0.87| .38  | -0.07 0.03               |
| Protein-rich products (vs. Produce)        | -0.03 (0.04) | -0.94| .35  | -0.10 0.04               |
| Individual-difference variables            |              |      |      |                          |
| Environmental worldview                    | -0.06 (0.02) | -3.54| <.001| -0.09 -0.03              |
| Climate change knowledge                   | 0.14 (0.07)  | 1.95 | .01  | -0.001 0.29              |
| Numeracy                                   | -0.03 (0.01) | -3.01| .003 | -0.06 -0.01              |
| Need for cognition                         | -0.005 (0.001) | -1.90| .06  | -0.05 0.001              |
| Control variables                          |              |      |      |                          |
| Age                                        | -0.01 (0.001) | -5.84| <.001| -0.01 -0.003             |
| Male                                       | 0.06 (0.02)  | 2.52 | .001 | 0.01 0.11                |
| Education                                  | 0.05 (0.02)  | 2.04 | .02  | 0.002 0.10               |
| Intercept                                  | 0.28 (0.03)  | 17.02| <.001| 0.24 0.31                |
| BIC                                        | 166          |      |      | 134                       |
| R²                                         | .05          |      |      | .19                       |
Table S10.B. Coefficient estimates obtained from four additional logistic regression models, each additionally including two way-interactions between format and food group and the individual-difference variables; predicting participants’ average confidence into estimates.

| Coefficient                                                                 | B (SE) | t   | p    | 95% Confidence Interval | BIC  | R²  |
|----------------------------------------------------------------------------|--------|-----|------|-------------------------|------|-----|
| Model 3                                                                    |        |     |      |                         |      |     |
| Format (gram vs. percent) x Environmental worldview                        | 0.04 (0.03) | 1.13 | .26  | -0.03                   | 0.10 | 151 | .18 |
| Dairy (vs. Produce) x Environmental worldview                              | -0.02 (0.03) | -0.61 | .54  | -0.09                   | 0.05 |      |     |
| Protein-rich products (vs. Produce) x Environmental worldview             | -0.02 (0.05) | -0.34 | .73  | -0.11                   | 0.07 |      |     |
| Model 4                                                                    |        |     |      |                         |      |     |
| Format (gram vs. percent) x Climate change knowledge                      | 0.09 (0.15) | 0.62 | .53  | -0.20                   | 0.39 | 152 | .18 |
| Dairy (vs. Produce) x Climate change knowledge                            | 0.09 (0.15) | 0.59 | .56  | -0.20                   | 0.38 |      |     |
| Protein-rich products (vs. Produce) x Climate change knowledge           | 0.05 (0.19) | 0.27 | .79  | -0.32                   | 0.42 |      |     |
| Model 5                                                                    |        |     |      |                         |      |     |
| Format (gram vs. percent) x Numeracy                                      | 0.02 (0.03) | 0.63 | .53  | -0.04                   | 0.07 | 150 | .19 |
| Dairy (vs. Produce) x Numeracy                                            | -0.01 (0.03) | -0.48 | .63  | -0.07                   | 0.04 |      |     |
| Protein-rich products (vs. Produce) x Numeracy                           | 0.04 (0.04) | 1.19 | .23  | -0.03                   | 0.11 |      |     |
| Model 6                                                                    |        |     |      |                         |      |     |
| Format (gram vs. percent) x Need for cognition                            | 0.01 (0.03) | 0.21 | .83  | -0.05                   | 0.06 | 149 | .19 |
| Dairy (vs. Produce) x Need for cognition                                  | -0.03 (0.03) | -1.01 | .31  | -0.09                   | 0.03 |      |     |
| Protein-rich products (vs. Produce) x Need for cognition                 | 0.03 (0.04) | 0.94 | .35  | -0.04                   | 0.11 |      |     |
Table S11.A. Linear regression, predicting frequency of missing answers across four estimates by each participant, made in different formats (grams of GHG emissions versus percentage reductions; N = 627).

| Coefficient | Model 1 | | | Model 2 | | |
|-------------|---------|---|---|---------|---|---|
|             | B (SE)  | t  | p  | 95% Confidence Interval | B (SE)  | t  | p  | 95% Confidence Interval |
| Format (gram vs. percent) | -0.06 (0.03) | -2.05 | .04 | -0.12 0.002 | -0.06 (0.03) | -1.94 | .05 | -0.12 0.001 |
| Dairy (vs. Produce) | -0.02 (0.04) | -0.65 | .52 | -0.10 0.05 |
| Protein-rich products (vs. Produce) | -0.04 (0.04) | -1.18 | .24 | -0.12 0.03 |
| Individual-difference variables | | | | | | |
| Environmental worldview | -0.04 (0.02) | -1.66 | .10 | -0.08 0.01 |
| Climate change knowledge | -0.06 (0.10) | -0.58 | .56 | -0.25 0.14 |
| Numeracy | -0.01 (0.02) | -0.45 | .65 | -0.04 0.03 |
| Need for cognition | -0.002 (0.02) | -0.11 | .91 | -0.04 0.03 |
| Control variables | | | | | | |
| Age | 0.001 (0.001) | 0.60 | .55 | -0.002 0.003 |
| Male | 0.02 (0.03) | 0.55 | .59 | -0.05 0.80 |
| Education | -0.05 (0.03) | -1.59 | .11 | -0.05 0.08 |
| Intercept | 0.07 (0.02) | 3.31 | .001 | 0.03 0.11 | 0.29 (0.11) | 2.63 | .01 | -0.12 0.01 |
| BIC | 577 | 624 |
| R² | .01 | .01 |

Note. The distribution of confidence values was significantly different from 0 (Shapiro Wilk-Test: p < .001). Values were thus log-transformed in advance to this analysis. Less answers were missing when estimates were made in percent (M = 0.01 [SE = 0.01]), compared to gram (M = 0.08 [SE = .03]; t(400) = 4.00, p < .001, d(Cohen) = .41).
Table S11.B. Coefficient estimates obtained from four additional regression models, each including the two way-interaction between food group and the individual-difference variables; predicting frequency of missing answers across four estimates by each participant, made in different formats (grams of GHG emissions versus percentage reductions; N = 627).

| Model 3 | Coefficient | B (SE) | t     | p   | 95% Confidence Interval | BIC | R²  |
|---------|-------------|--------|-------|-----|-------------------------|-----|-----|
| Format (gram vs. percent) x Environmental worldview | 0.07 (0.04) | 1.76   | .08  | -0.01 | 0.15 | 639 | .01 |
| Dairy (vs. Produce) x Environmental worldview | 0.04 (0.05) | 0.78   | .43  | -0.06 | 0.13 |
| Protein-rich products (vs. Produce) x Environmental worldview | 0.05 (0.05) | 0.96   | .34  | -0.05 | 0.14 |

| Model 4 | Coefficient | B (SE) | t     | p   | 95% Confidence Interval | BIC | R²  |
|---------|-------------|--------|-------|-----|-------------------------|-----|-----|
| Format (gram vs. percent) x Climate change knowledge | 0.36 (0.17) | 2.08   | .04  | 0.02 | 0.70 | 632 | .02 |
| Dairy (vs. Produce) x Climate change knowledge | 0.53 (0.21) | 2.52   | .01  | 0.12 | 0.94 |
| Protein-rich products (vs. Produce) x Climate change knowledge | 0.48 (0.21) | 2.35   | .02  | 0.08 | 0.88 |

| Model 5 | Coefficient | B (SE) | t     | p   | 95% Confidence Interval | BIC | R²  |
|---------|-------------|--------|-------|-----|-------------------------|-----|-----|
| Format (gram vs. percent) x Numeracy | 0.03 (0.03) | 1.09   | .28  | -0.03 | 0.10 | 641 | .01 |
| Dairy (vs. Produce) x Numeracy | -0.02 (0.04) | -0.46  | .64  | -0.10 | 0.06 |
| Protein-rich products (vs. Produce) x Numeracy | -0.003 (0.04) | -0.07  | .95  | -0.08 | 0.07 |

| Model 6 | Coefficient | B (SE) | t     | p   | 95% Confidence Interval | BIC | R²  |
|---------|-------------|--------|-------|-----|-------------------------|-----|-----|
| Format (gram vs. percent) x Need for cognition | 0.02 (0.03) | 0.60   | .55  | -0.05 | 0.07 | 642 | .01 |
| Dairy (vs. Produce) x Need for cognition | 0.001 (0.04) | 0.05   | .96  | -0.08 | 0.08 |
| Protein-rich products (vs. Produce) x Need for cognition | 0.02 (0.04) | 0.55   | .58  | -0.06 | 0.10 |
Table S12. Pearson correlations ($r (p)$) of continuous predictors and main dependent variables in this study.

|                      | (1)  | (2)  | (3)  | (4)  | (5)  | (6)  | (7)  | (8)  | (9)  |
|----------------------|------|------|------|------|------|------|------|------|------|
| (1) Number of rules  | 1    |      |      |      |      |      |      |      |      |
| (2) Effectiveness of rules according to life cycle analyses | .17 (<.001) | 1    |      |      |      |      |      |      |      |
| (3) Confidence       | -.11 (.01) | -.08 (.08) | 1    |      |      |      |      |      |      |
| (4) Number of missing estimates | -.11 (.004) | -.03 (.34) | -    | 1    |      |      |      |      |      |
| (5) Environmental worldview | .22 (<.001) | .11 (.001) | -.22 (<.001) | -.09 (.03) | 1    |      |      |      |      |
| (6) Climate change knowledge | .35 (<.001) | .01 (.01) | -.02 (.59) | -.07 (.08) | .32 (<.001) | 1    |      |      |      |
| (7) Numeracy         | .26 (<.001) | .06 (.14) | -.17 (<.001) | -.05 (.22) | .19 (<.001) | .28 (<.001) | 1    |      |      |
| (8) Need for Cognition | .22 (<.001) | .05 (26) | -.12 (.01) | -.04 (.37) | .18 (<.001) | .27 (<.001) | .23 (<.001) | 1    |      |
| (9) Age              | .09 (.03) | .09 (.03) | -.27 (<.001) | -.03 (.47) | -.28 (.001) | .11 (.005) | .04 (.36) | .01 (.01) | 1    |