

# Items

used in the experiment reported in the article [#Knowledge: Improving food-related knowledge via seeding implemented as a social media intervention](#)

2024-07-08

```
# Packages
library(tidyverse)
library(patchwork)
library(latex2exp)
library(kableExtra)
library(papaja)
library(extrafont)
```

```
# Plot colors
clrs <- c("#54AA8F", "#00335B",
          "#22A884FF", "#414487FF",
          "#496aa2", "#e46c0a", "#90b6d4")
```

```
# ggplot theme
theme_nice <- function(){
  theme_minimal(base_family = "Jost") +
    theme(plot.title      = element_text(hjust = 0.5, size = 20),
          panel.grid.minor = element_blank(),
          text             = element_text(size = 20),
          panel.border     = element_rect(colour = "black", linewidth = 0.5, fill = NA),
          axis.title.x     = element_text(margin = unit(c(3, 0, 0, 0), "mm")),
          axis.title.y     = element_text(margin = unit(c(3, 3, 0, 0), "mm"), angle = 90),
          legend.title     = element_text(face = "bold", size = 16),
          strip.text       = element_text(face = "bold"),
          legend.position  = "bottom"
    )
}
```

Category	g CO2 pro kg				Kcal pro 100g			
	M	SD	Min	Max	M	SD	Min	Max
fruit & vegetables	740.83	297.58	310.00	1,190.00	48.42	22.20	16.00	93.00
meat & fish	11,070.83	8,074.22	4,640.00	26,920.00	165.58	117.63	60.00	502.00
dairy	5,264.17	3,705.50	1,560.00	13,090.00	235.17	194.97	46.00	741.00
grain products	1,257.50	835.20	560.00	3,390.00	303.33	71.48	150.00	379.00
sweets	2,899.17	1,702.25	1,030.00	6,250.00	413.08	130.07	160.00	567.00

```
p_size <- 3
lwd     <- 1.5
```

```
# Read in items
items <- read_csv2("../Materials/Seeding Fact Items/Items.csv")
```

## Descriptive Summary

### by Food Category

```
items %>%
  summarise(M_CO2    = mean(`g CO2 pro kg`),
            SD_CO2    = sd(`g CO2 pro kg`),
            Min_CO2    = min(`g CO2 pro kg`),
            Max_CO2    = max(`g CO2 pro kg`),
            M_Kcal     = mean(`Kcal pro 100g`),
            SD_Kcal     = sd(`Kcal pro 100g`),
            Min_Kcal    = min(`Kcal pro 100g`),
            Max_Kcal    = max(`Kcal pro 100g`),
            .by="category") %>%
  mutate_if(is.numeric, printnum) %>%
  kbl(col.names = c("Category", rep(c("M", "SD", "Min", "Max"), 2))) %>%
  kable_paper() %>%
  add_header_above(c(" " = 1, "g CO2 pro kg" = 4, "Kcal pro 100g" = 4))
```

Category	M	SD	Min	Max
fruit & vegetables	736.67	414.05	360.00	1,180.00
meat & fish	11,710.00	10,571.43	5,060.00	23,900.00
dairy	5,846.67	4,197.35	1,800.00	10,180.00
grain products	1,363.33	781.37	670.00	2,210.00
sweets	3,150.00	2,289.08	1,100.00	5,620.00

## by Seeding Sets

### g CO2 pro kg

```
items %>%
  filter(seeding_CO2 == 1) %>%
  summarise(M_CO2 = mean(`g CO2 pro kg`),
            SD_CO2 = sd(`g CO2 pro kg`),
            Min_CO2 = min(`g CO2 pro kg`),
            Max_CO2 = max(`g CO2 pro kg`),
            .by=c("category")) %>%
  mutate_if(is.numeric, printnum) %>%
  kbl(col.names = c("Category", "M", "SD", "Min", "Max")) %>%
  kable_paper()
```

### Kcal pro 100g

```
items %>%
  filter(seeding_Kcal == 1) %>%
  summarise(M_Kcal = mean(`Kcal pro 100g`),
            SD_Kcal = sd(`Kcal pro 100g`),
            Min_Kcal = min(`Kcal pro 100g`),
            Max_Kcal = max(`Kcal pro 100g`),
            .by=c("category")) %>%
  mutate_if(is.numeric, printnum) %>%
  kbl(col.names = c("Category", "M", "SD", "Min", "Max")) %>%
  kable_paper()
```

Category	M	SD	Min	Max
fruit & vegetables	42.67	25.70	19.00	70.00
meat & fish	156.67	74.78	73.00	217.00
dairy	248.00	152.83	78.00	374.00
grain products	305.33	83.27	212.00	372.00
sweets	416.00	117.04	306.00	539.00

## Lists

### Target Fact Items

```
items %>%
  select(ID_item,name,category,`g CO2 pro kg`,`Kcal pro 100g`,`Seeditems CO2` = seeding_CO2,
  kbl(align = "c") %>%
  column_spec(4,color = "white",background = spec_color(items$`g CO2 pro kg`)) %>%
  column_spec(5,color = "white",background = spec_color(items$`Kcal pro 100g`,option = "D"))
```

ID_item	name	category	g CO2 pro kg	Kcal pro 100g	Seeditems CO2	Seed
1	Zucchini	fruit & vegetables	860	19	0	
2	Potatoes	fruit & vegetables	360	71	1	
3	Bell pepper	fruit & vegetables	1190	38	0	
4	Carrots	fruit & vegetables	310	39	0	
5	Broccoli	fruit & vegetables	1180	34	1	
6	Lettuce (Iceberg)	fruit & vegetables	590	16	0	
7	Pineapples	fruit & vegetables	680	57	0	
8	Apple	fruit & vegetables	500	54	0	
9	Banana	fruit & vegetables	990	93	0	
10	Orange	fruit & vegetables	670	47	1	
11	Grapes	fruit & vegetables	580	70	0	
12	Raspberries	fruit & vegetables	980	43	0	
13	Goat	meat & fish	20960	198	0	
14	Fish fingers (frozen)	meat & fish	6400	188	0	
15	Meatballs	meat & fish	5670	217	0	
16	Salami	meat & fish	5060	502	1	
17	Beef	meat & fish	26920	98	0	
18	Pork	meat & fish	6620	147	0	
19	Chicken	meat & fish	4640	102	0	
20	Lamb	meat & fish	23900	112	1	
21	Octopus	meat & fish	6170	73	1	
22	Salmon	meat & fish	6820	180	0	
23	Shrimp (frozen)	meat & fish	12100	60	0	
24	Tuna (canned)	meat & fish	7590	110	0	
25	Quark (low-fat)	dairy	2450	70	0	
26	Butter	dairy	10180	741	1	
27	Milk	dairy	1800	46	1	
28	Cream (30%)	dairy	5010	292	0	
29	Eggs	dairy	2540	137	0	
30	Sour Cream	dairy	4260	147	0	
31	Gouda	dairy	13090	364	0	
32	Mozzarella	dairy	7660	238	0	
33	Parmesan	dairy	7410	374	0	
34	Feta	dairy	5560	234	1	
35	Yogurt	dairy	1650	78	0	
36	Fruit Yogurt	dairy	1560	101	0	
37	Rye bread	grain products	1210	212	1	
38	Wheat bread	grain products	720	285	0	
39	Croissant	grain products	3390	332	0	
40	Rice (raw)	grain products	2210	361	1	
41	Pizza dough	grain products	720	235	0	
42	Gnocchi	grain products	600	150	0	
43	Tortilla bread, wheat	grain products	740	304	0	
44	Bulgur (raw)	grain products	560	314	0	
45	Corn flakes	grain products	1510	379	0	
46	Pasta (raw)	grain products	1460	330	0	
47	Quinoa (raw)	grain products	1300	366	0	
48	Oat flakes	grain products	670	372	1	
49	Chocolate chip cookie	sweets	2730	434	1	
50	Chocolate cake	sweets	2360	360	0	

## Trivia Items

15 trivia facts will be shown during the seeding phase (`type = Post`) and 6 will be used in a 2AFC-recognition test in the final questionnaire (`type = Test`).

```
trivia <- c("An average ear of corn has an even number of rows, usually 16",
  "A watermelon consists of about 95 percent water.",
  "Every German needs about 2,700 square meters of farmland for food supply.",
  "Children see junk food advertisements an average of 27 times a day.",
  "Approximately 500 million snails are eaten in France every year.",
  "The largest cashew tree in the world covers an area of 8,500 square meters.",
  "The price of food increased by 9 percent between August 2022 and August 2023.",
  "Germans eat about 20 kilos of tomatoes per year.",
  "Caffeine has a half-life of four to six hours.",
  "Chia seeds contain five times more calcium than milk.",
  "In Germany, peas were grown on 82,600 hectares of land in 2020.",
  "In Germany, approximately 36,000 tons of pears were harvested in 2023.",
  "Rosemary can be harvested after a germination period of about four weeks.",
  "There are about 30mg of caffeine in a cup of green tea.",
  "Farmers plant radishes with approximately 200 seeds per square meter.",
  "The cultivation area of corn in Germany is around 472,200 hectares.",
  "The German Nutrition Society recommends 400 grams of vegetables per day.",
  "McDonald's sells 75 hamburgers per second.",
  "Wheat requires about 500 liters of water per kilogram of dry matter.",
  "China produced approximately 63 million tons of salt in 2019.",
  "There are over 40 different types of kiwi.")

trivia_df <- data.frame(ID   = 1:length(trivia),
  fact = trivia,
  type = c(rep("Post",15),rep("Test",6)))

trivia_df %>% kbl(align = "c")
```

ID	fact	type
1	An average ear of corn has an even number of rows, usually 16	Post
2	A watermelon consists of about 95 percent water.	Post
3	Every German needs about 2,700 square meters of farmland for food supply.	Post
4	Children see junk food advertisements an average of 27 times a day.	Post
5	Approximately 500 million snails are eaten in France every year.	Post
6	The largest cashew tree in the world covers an area of 8,500 square meters.	Post
7	The price of food increased by 9 percent between August 2022 and August 2023.	Post
8	Germans eat about 20 kilos of tomatoes per year.	Post
9	Caffeine has a half-life of four to six hours.	Post
10	Chia seeds contain five times more calcium than milk.	Post
11	In Germany, peas were grown on 82,600 hectares of land in 2020.	Post
12	In Germany, approximately 36,000 tons of pears were harvested in 2023.	Post
13	Rosemary can be harvested after a germination period of about four weeks.	Post
14	There are about 30mg of caffeine in a cup of green tea.	Post
15	Farmers plant radishes with approximately 200 seeds per square meter.	Post
16	The cultivation area of corn in Germany is around 472,200 hectares.	Test
17	The German Nutrition Society recommends 400 grams of vegetables per day.	Test
18	McDonald's sells 75 hamburgers per second.	Test
19	Wheat requires about 500 liters of water per kilogram of dry matter.	Test
20	China produced approximately 63 million tons of salt in 2019.	Test
21	There are over 40 different types of kiwi.	Test

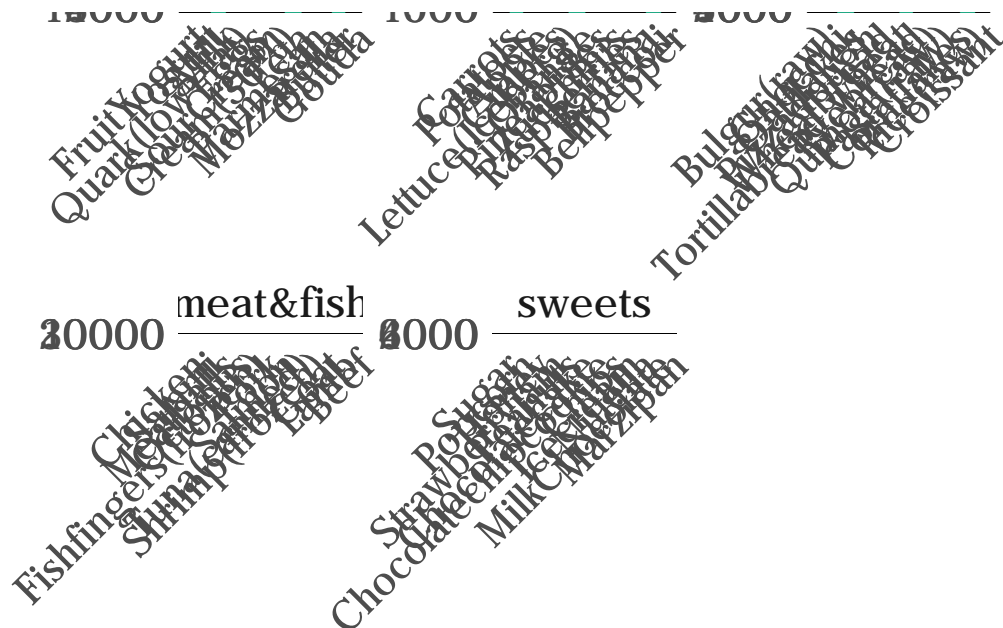
## Plot

### CO2e per kg

### Overall

```
ggplot(items,aes(x = fct_reorder(name,`g CO2 pro kg`),
                  y = `g CO2 pro kg`,
                  color = factor(seeding_CO2))) +
  geom_point(size=p_size) +
  geom_linerange(aes(ymax = `g CO2 pro kg`, ymin = 0),linewidth=lwd) +
  facet_wrap(~category,scales="free",nrow=2)+
  labs(title = "",
       x      = "",
       y      = "",
       color = "Seed Item") +
```

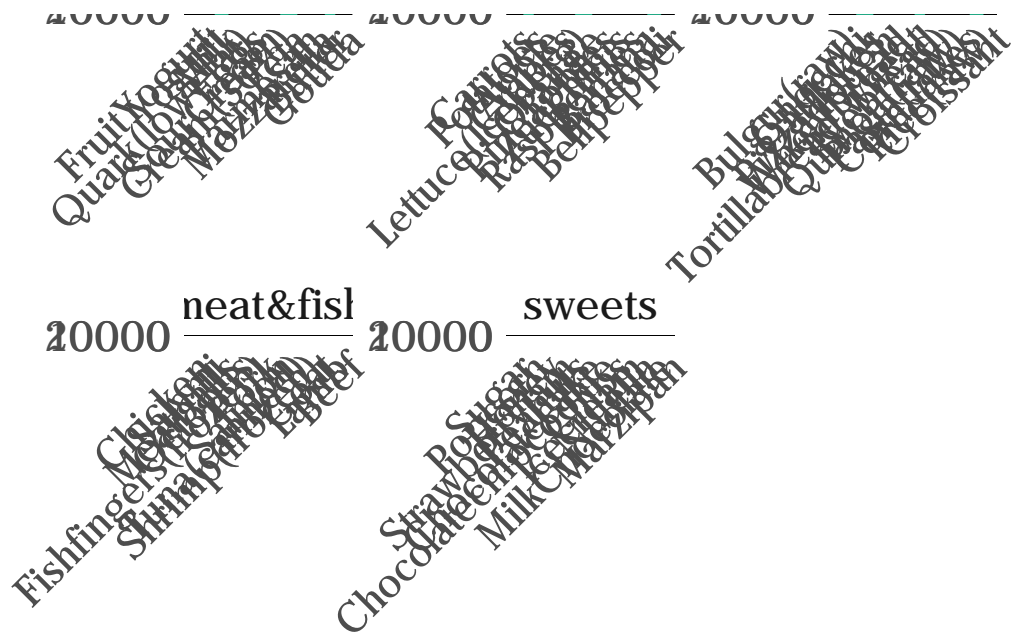
```
theme_nice() +
scale_color_manual(values = c("black", "#22A884FF")) +
theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
scale_y_continuous(expand = expansion(mult = c(0, 0.2)))
```



## Relative

```
ggplot(items, aes(x = fct_reorder(name, `g CO2 pro kg`),
y = `g CO2 pro kg`,
color = factor(seeding_CO2))) +
geom_point(size=p_size) +
geom_linerange(aes(ymax = `g CO2 pro kg`, ymin = 0), linewidth=lwd) +
facet_wrap(~category, scales="free", nrow=2) +
labs(title = "",
x = "",
y = "",
color = "Seed Item") +
scale_color_manual(values = c("black", "#22A884FF")) +
theme_nice() +
theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
scale_y_continuous(expand = c(0, 0), limits = c(0, 28500))
```

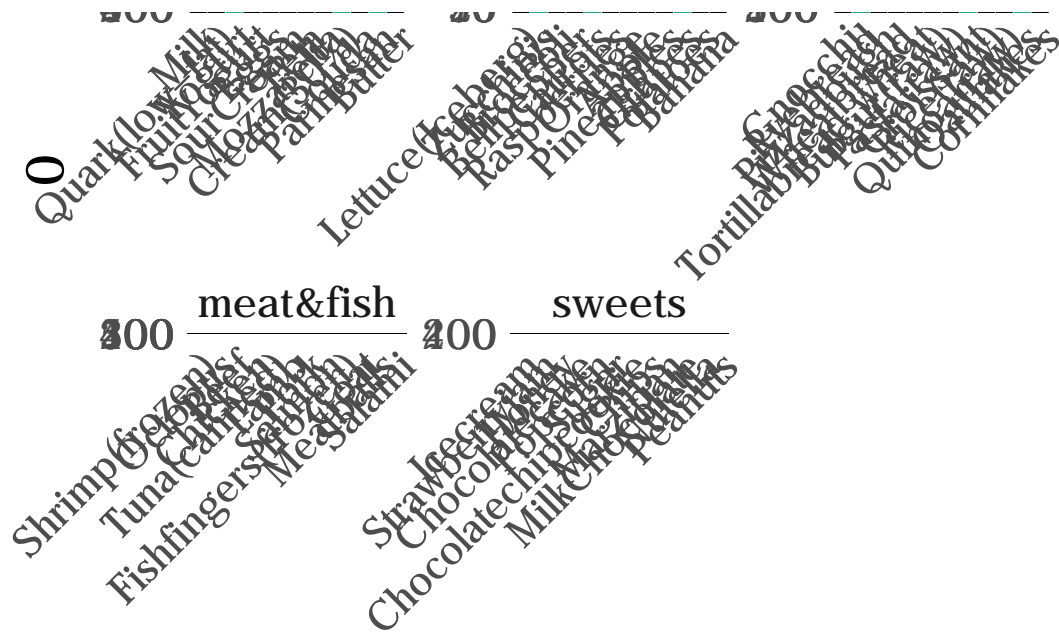




Kcal per 100g

Overall

```
ggplot(items,aes(x = fct_reorder(name,`Kcal pro 100g`),
  y = `Kcal pro 100g`,
  color = factor(seeding_Kcal))) +
  geom_point(size=p_size) +
  geom_linerange(aes(ymax = `Kcal pro 100g`, ymin = 0),linewidth=lwd) +
  facet_wrap(~category,scales="free",nrow=2)+
  labs(title = "",
    x = "",
    y = "",
    color = "Seed Item") +
  scale_color_manual(values = c("black","#22A884FF")) +
  theme_nice() +
  theme(axis.text.x = element_text(angle = 45,hjust = 1)) +
  scale_y_continuous(expansion(mult = c(0, 0.2)))
```



## Relative

```
ggplot(items, aes(x = fct_reorder(name, `Kcal pro 100g`),
  y = `Kcal pro 100g`,
  color = factor(seeding_Kcal))) +
  geom_point(size=p_size) +
  geom_linerange(aes(ymax = `Kcal pro 100g`, ymin = 0), linewidth=lwd) +
  facet_wrap(~category, scales="free", nrow=2) +
  labs(title = "",
    x = "",
    y = "",
    color = "Seed Item") +
  scale_color_manual(values = c("black", "#22A884FF")) +
  theme_nice() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
  scale_y_continuous(expand = c(0, 0), limits = c(0, 800))
```

