

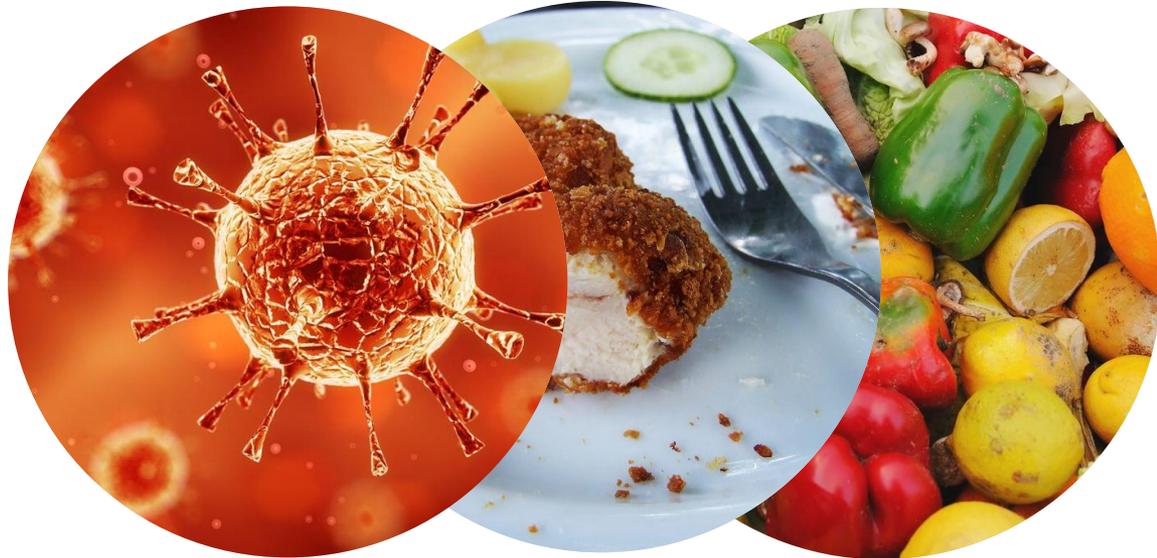
# COVID-19 and the effects on Dutch consumers' food waste behaviour

## Online consumer survey

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# 1. Introduction

- The COVID-19 crisis has a huge influence on our daily lives and routines
- Lockdown measures imposed by the Dutch government between 16 March – 1 June 2020 influence the food system and how consumers act in it
- Dutch consumers discard on average 34 kg/pp/py of edible food (*Voedingscentrum, 2019*)
- Under normal conditions it is very difficult to change consumers' behaviour on food and food waste, but the COVID-19 crisis provoked and necessitated rapid changes



## 2. Study aim

To gain insights on the effects of the COVID-19 crisis and its quarantine & 1.5m social distancing restrictions on the shopping, storing, preparation and food waste behaviour of Dutch households, and how these differ from the pre-COVID-19 period

# 3. Methods [1]

- Online quantitative survey
- Representative sample of 1500 Dutch households
- Survey questions based on:
  1. The validated REFRESH framework on food waste drivers within households ([REFRESH 2017](#)) - using the Motivation-Opportunity-Ability model
  2. 'Voedselverspilling trendmeting 2019' survey on food waste in Dutch households coordinated by Voedingscentrum ([Voedingscentrum 2019](#))
- Survey questions were related to the 'intelligent lockdown' period in the Netherlands – starting on the **16<sup>th</sup> of March.**

# 3. Methods [2] – lockdown measures in NL

- Data collection period: 8-17 May 2020
- Intelligent lockdown period in The Netherlands (NL)
  - Until the 11<sup>th</sup> of May: 'stay home as much as possible'
  - After the 11<sup>th</sup> of May: 'avoid crowded places'

Measures that were in place during the whole data collection period:

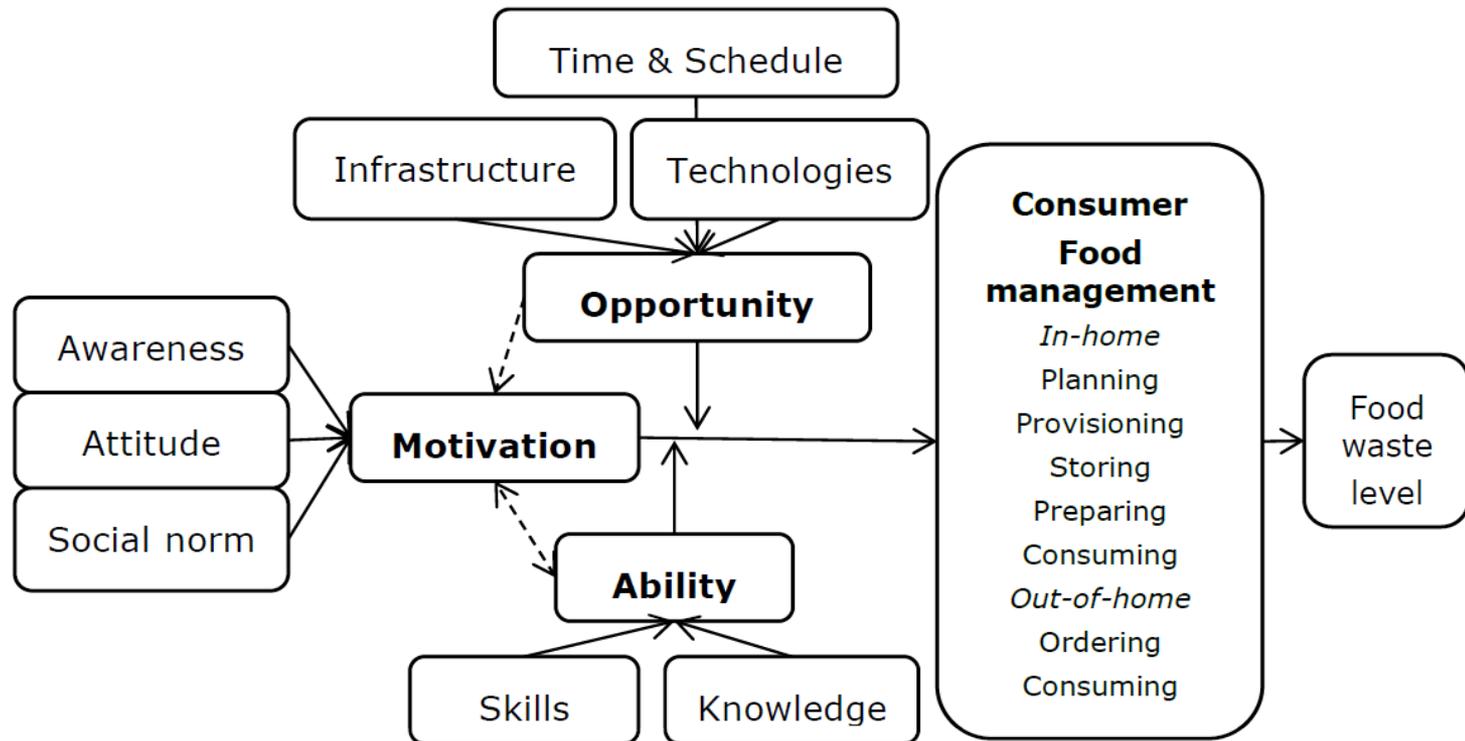
- Stay home (quarantine) in case of symptom like having a cold, coughing, fever etc.
- Social distancing (1.5 meters) from persons outside household
- Working from home as much as possible
- Restaurants, bars, cafes, (movie)theatres closed

# 3. Methods [3] – lockdown measures in NL

- Large events (such as concerts, festivals) cancelled
- Strict measures for grocery shopping: shopping alone, floor linings to indicate 1.5m distancing, disinfectant solutions to clean hands and shopping carts
- No gathering in groups of >2 persons (except same household)
- Households only allowed to have 3 external guests, ensuring 1.5m social distancing
- Elderly care homes and hospitals closed for visitors
- Online education for schools and universities
  - *Primary schools: re-opened (partly) on the 11<sup>th</sup> of May*
- Use of public transport only for necessary travels (when working in a vital job for example)

# 3. Methods [4] - MOA-framework for understanding consumer food waste

**Consumers Food Waste Model**



Van Geffen et al, 2016

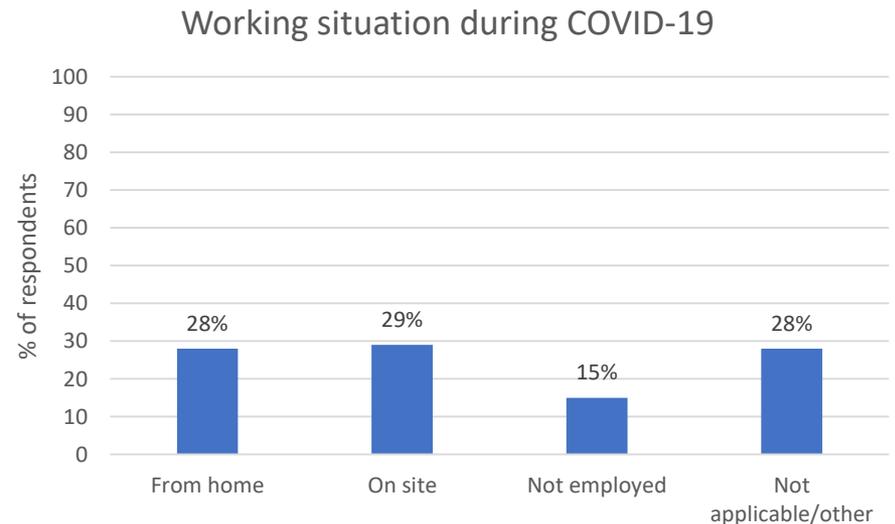
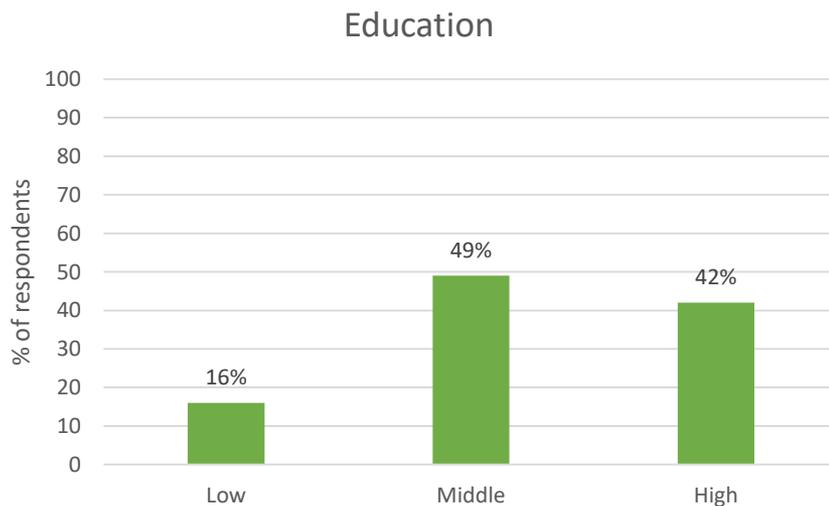
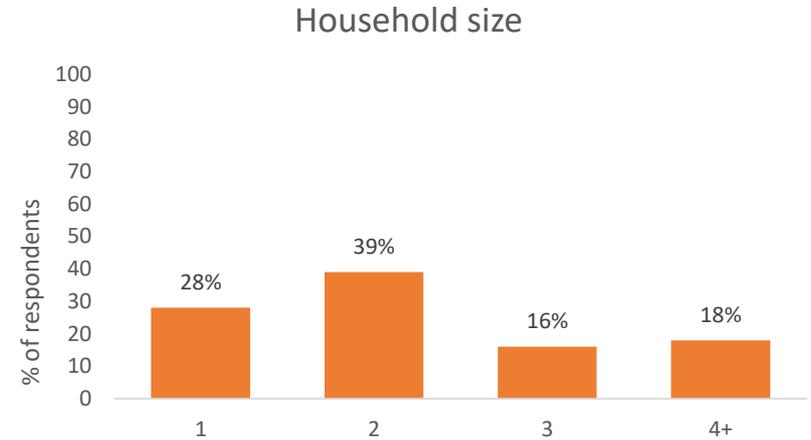
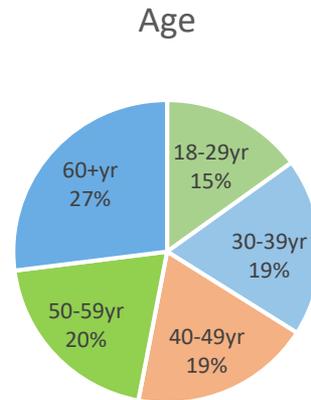
## 4. Research hypotheses

- H1: The **food waste amounts** of households are different from pre-COVID-19
- H2: The **shopping** behaviour of households is different from pre-COVID-19
- H3: The **preparation** behaviour of households is different from pre-COVID-19
- H4: The **storing** behaviour of households is different from pre-COVID-19
- H5: The **discard** behaviour of households is different from pre-COVID-19
- H6: The **Motivation, Ability and Opportunity** (MOA) of households related to food waste is different from pre-COVID-19

# 5. Results

# 5.1 Sample characteristics

- N=1500
- 41.8% male  
58.7% female



## 5.2 Shopping behaviour results

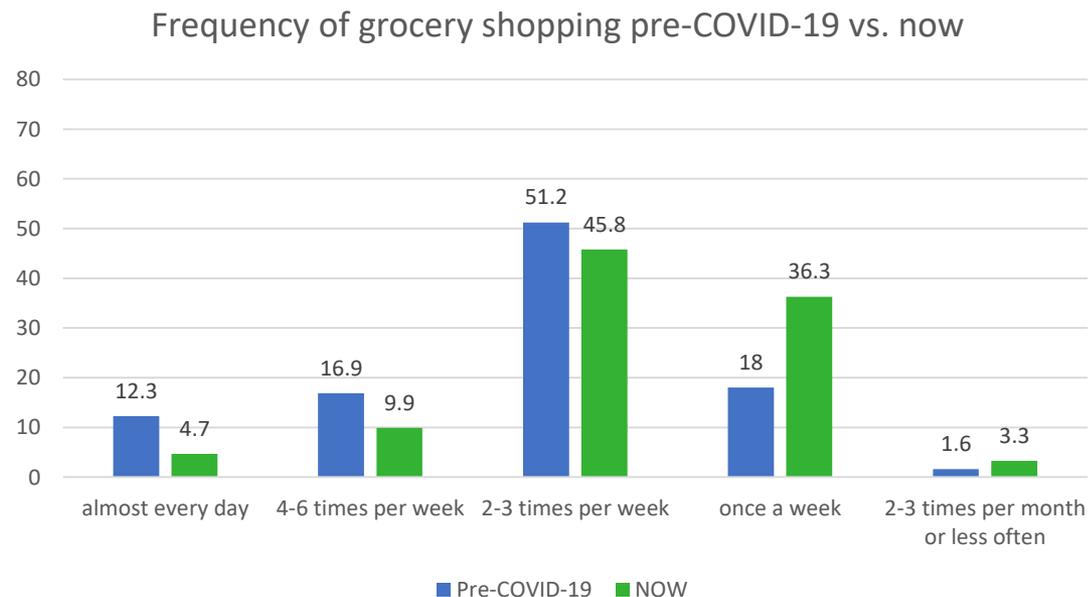
H2: The shopping behaviour of households is different from pre-COVID-19

# Survey items shopping behaviour

- Frequency of grocery shopping
- Shopping outlets
- Planning and impulse buying
- Hoarding
- Purchased food products
- Eating at home

# Frequency of grocery shopping [1]

- The largest part of respondents (~50%) does groceries 2-3 times per week (both pre-COVID-19 and now)
- The frequencies 'once a week' and '2-3 times per month or less' increase, while the higher frequencies of shopping decrease. This indicates less frequent grocery shopping during COVID-19.



# Frequency of grocery shopping [2]

- Difference in frequency of shopping, pre-COVID-19 vs. now:
  - More than half (57%) of the respondents did not change their frequency of grocery shopping during COVID-19 measures
  - The group that does groceries less frequent now (38%), is significantly larger than the group that does groceries more frequent (5%)\*

Difference pre-COVID-19 vs. now	
Less frequent a	38%
Just as much	57%
More frequent b	5%

Sign test:  $Z=19.96$ ,  $p=<0.001^*$

# Shopping outlets

- No. of consumers making use of online shops, local shops, farm shops, the market and take-away outlets increased



- No. of respondents that do grocery shopping in the supermarket remains the same (~98% before and now)
- However, the frequency of shopping at the market, supermarket, local shops, farm shops and take-away was lower during COVID-19. Online shopping occurred more often.

# Planning and impulse buying [1]

- Respondents plan more in advance what their household shall eat, before going to the shop:

Mean score pre-COVID-19: 4.9 vs. mean score NOW 5.3,  
 $p < 0.001^*$

- Impulsive buying decreased a bit (making the decision of what household shall eat in the shop) :

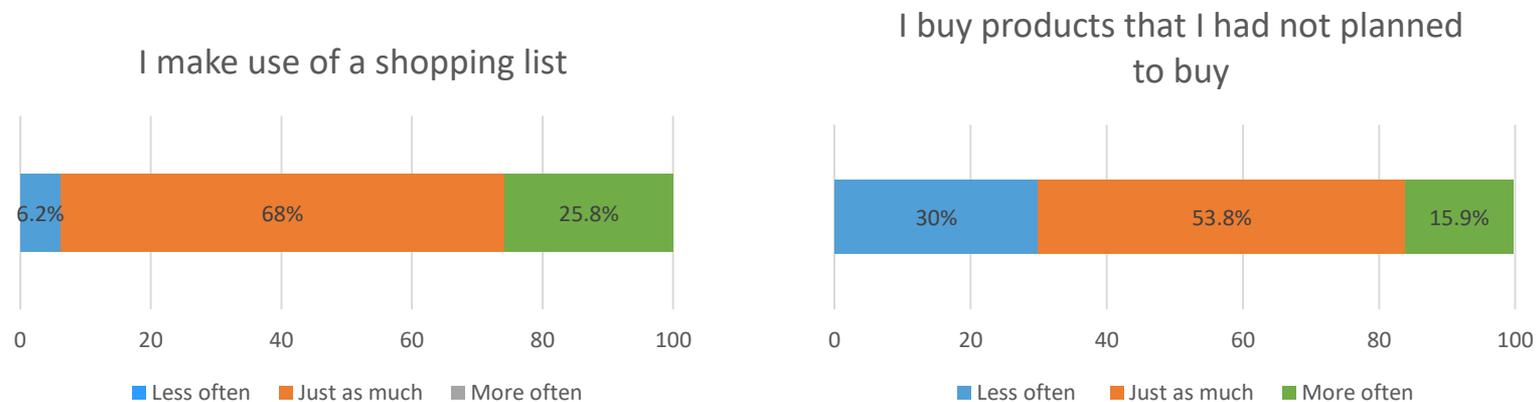
Mean score pre-COVID-19: 3.7 vs. mean score NOW 3.4,  
 $p < 0.001^*$

*Statements on 7-point Likert scales, ranging from 'never' to 'always'*

*\*Paired samples T-tests*

# Planning and impulse buying [2]

- 26% of the respondents more often makes use of a shopping list now (mean score 4.4)\*
- 30% of the respondents has less impulse purchases now (products they did not intend to buy) (mean score 3.6)\*



*7-point Likert scales per item, ranging from 'much less (often)' to 'much more (often)'*

*% less often = scores 1-3, % just as much = score 4, % more often = scores 5-7*

# Hoarding

- ~40% buys more foods at once per shopping trip; ~40% does not buy more foods at once
- A quarter of the respondents (24%) worries about the availability of food in the shops, more than half of the respondents (55%) does not worry
- 30% started stock(piling) up on supplies more than before corona; the majority (50%) did not stock up on supplies
- Group that did stock(pile) up on supplies:
  - 48% is aware of the fact that there might be less food left for others - 41% disagrees to this statement
  - 43% thinks they might waste more of this food later - 41% disagrees to this statement

# Purchased food products – list of 20 foods

1. Fresh vegetables
2. Preserved vegetables
3. Preserved legumes
4. Fresh fruits
5. Non-fresh fruits (jar/can/frozen)
6. Potatoes and potato products
7. Pasta and noodles
8. Rice, couscous, bulgur and wraps
9. Meat (incl. sliced meat)
10. Fresh fish and shellfish
11. Non-fresh fish and shellfish (jar/can/frozen)
12. Fresh bread
13. Pre-baked bread
14. Dairy foods
15. Dairy drinks
16. Alcoholic beverages
17. Non-alcoholic beverages
18. Ready-to-eat meals
19. Cakes and pie
20. Snacks

# Purchased food products

For all 20 food categories: the majority (~70-80%) indicated to buy just as much of the product as before corona

A number of significant changes were observed in the following categories:

- 24% buys more **preserved vegetables** (mean score 4.2)\*
- 26% buys more **fresh fruit** (mean score 4.3)\*
- 21% buys more **pasta and noodles** (mean score 4.2)\*
- 22% buys more **pre-baked bread** (mean score 4.1)\*
- 17% buys less **ready-to-eat meals** (mean score 3.8)\*

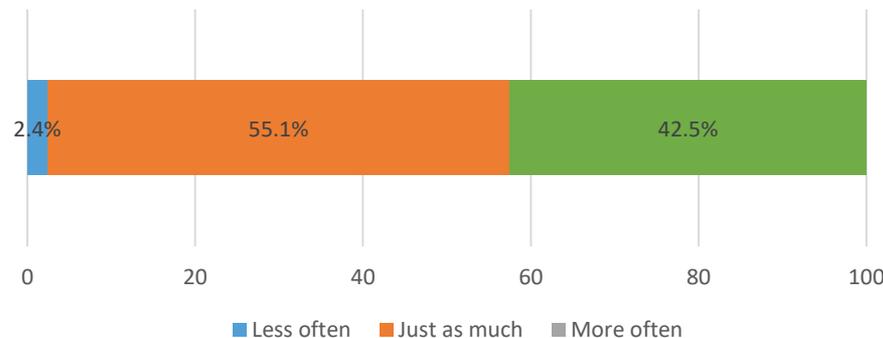
*7-point Likert scales per food product, ranging from 'much less' to 'much more'*

*\* $p < 0.001$ , One sample t-tests*

# Eating at home

43% eats at home more often now, 55% eats at home just as much as before COVID-19 (mean score 4.7)\*

Do you in general eat at home more often now, as compared to before the corona crisis?



*7-point Likert scales per item, ranging from 'much less (often)' to 'much more (often)*

*% less often = scores 1-3, % just as much = score 4, % more often = scores 5-7*

# Summary of results shopping behaviour [1]

- Most people do not change their **frequency of grocery shopping** – but a large group of respondents (~40%) does groceries less frequent during COVID-19
- Significantly more consumers started to make use of other **shopping outlets** (than supermarkets): online, local shops, market and take-away – the frequency of shopping at these outlets was lower during COVID-19, except for online shopping (higher)
- Respondents **plan** more in advance what their household shall eat, before going to the shop compared to before COVID-19
- A group of ~25% makes use of a **shopping list** more often during COVID-19
- A group of ~30 has less **impulse purchases** during COVID-19

# Summary of results shopping behaviour [2]

- The group that indicates to buy more foods at once per shopping trip now vs. the group that does not buy more at once is about the same size (~40%)
- **Hoarding:** about one third of respondents started stock(piling) up on supplies more than before COVID-19; the majority (50%) did not stock up on supplies
- Most respondents buy just a much of the different **food products**, as before COVID-19.
- About 1 on 4 consumers buys more: preserved vegetables, fresh fruits, pasta/noodles and pre-baked bread now. 17% buys less ready-to-eat meals.
- A large group (~40%) **eats at home** more often during COVID-19

## 5.3 Preparation behaviour results

H3: The preparation behaviour of households is different from pre-COVID-19

# Survey items preparation behaviour

- Precision cooking
- Menu selection
- Frequency of cooking
- Time spent on cooking

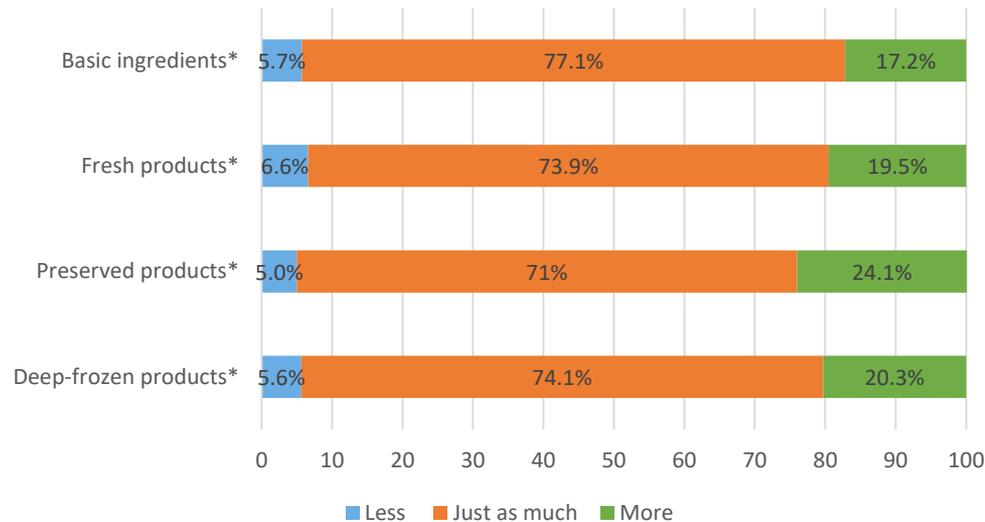
# Precision cooking

- Minimal differences were observed for precision cooking as compared to before COVID-19:
  - 10-15% is cooking more precise, weighing ingredients more often or paying more attention to not having unnecessary leftovers now
- 40% of respondents *never* weighs their ingredients during cooking

*7-point Likert scales per item, ranging from 'much less (often)' to 'much more (often)'*

*% less often = scores 1-3, % just as much = score 4, % more often = scores 5-7*

# Menu selection



Purchases in each category seem to slightly increase:

*\*Basic ingredients: mean score 4.1 on 7-point Likert scale*

*\*Fresh products: mean score 4.2 on 7-point Likert scale*

*\*Preserved products: mean score 4.2 on 7-point Likert scale*

*\*Deep-frozen products: mean score 4.2 on 7-point Likert scale*

# Frequency and time spent on cooking

- The majority of respondents cooks every day now (67%)
- 28% of respondents indicates they cook more often (mean score 4.3)\*
- 21% spends more time on cooking per meal now (mean score 4.2)\*

*7-point Likert scales per item, ranging from 'much less (often)' to 'much more (often)'*

*% less often = scores 1-3, % just as much = score 4, % more often = scores 5-7*

# Summary of results preparation behaviour

- Minimal differences in **precision cooking**; 15% does this more often now, as compared to pre-COVID-19
- **Purchases** of basic ingredients, fresh products, preserved products and deep-frozen products → all increased a bit for 17-24% - largest increase in preserved products (24% buys it more often)
- More **cooking at home**: about ~30% cooks more often and ~20% spends more time on cooking per meal

## 5.4 Storing behaviour results

H4: The storing behaviour of households is different from pre-COVID-19

# Survey items storing behaviour

- Stock management

# Stock management

- 33% of respondents has more in stock now (64% just as much) as compared to before COVID-19 (mean score 4.4)\*
- About 20% seems to know better what they have in stock now (mean score 4.3)\*
- Shelves and/or fridges are better organised now for 19% of respondents (mean score 4.2)\*

*7-point Likert scales per item, ranging from 'much less' to 'much more'*

*% less = scores 1-3, % just as much = score 4, % more = scores 5-7*

# Summary of results storing behaviour

- About one third of respondents has more in **stock** now
- A group of ~20% seems to better know what they have in stock, possibly by better **organizing shelves and fridges**

## 5.5 Food waste behaviour results

H1: The food waste amounts of households are different from pre-COVID-19

H5: The discard behaviour of households is different from pre-COVID-19

H6: The Motivation, Ability and Opportunity (MOA) of households related to food waste is different from pre-COVID-19

# Survey items food waste behaviour

- Self-reported food waste (in general + per food category)
- Reasons for discarding
- Leftover handling
- Motivation (M), Abilities (A) and Opportunities (O) related to food waste

# Food categories - self-reported food waste

1. Fresh vegetables
2. Preserved vegetables
3. Preserved legumes
4. Fresh fruits
5. Non-fresh fruits (jar/can/frozen)
6. Potatoes and potato products
7. Pasta and noodles
8. Rice, couscous, bulgur and wraps
9. Meat (incl. sliced meat)
10. Fresh fish and shellfish
11. Non-fresh fish and shellfish (jar/can/frozen)
12. Fresh bread
13. Pre-baked bread
14. Dairy foods
15. Dairy drinks
16. Alcoholic beverages
17. Non-alcoholic beverages
18. Ready-to-eat meals
19. Cakes and pie
20. Snacks
21. Meal leftovers

# Food waste amounts [1]

- The majority (70-79%) indicates to waste just as much of the different foods as before COVID-19
- For all 21 food categories: about 15-21% of the respondents indicate to waste less
- On average, about 7% of respondents indicates to waste more
- ~ 20% is wasting less: **fresh vegetables** (including pre-cut vegetables), **fresh fruit** and **meal leftovers** (mean scores for all 3 categories 3.7)\*

*7-point Likert scales per item, ranging from 'much less' to 'much more'*

*% less = scores 1-3, % just as much = score 4, % more = scores 5-7*

*\* $p < 0.001$ , One sample t-tests*

# Food waste amounts [2] – reasons discarding

- Reasons discarding less fresh vegetables (N=230):

Reasons	%
1. I ate everything I bought	59.6
2. I only buy exactly what I need of this product now	39.6
3. I make use of easy-to-portion products	18.7

- Reasons discarding less fresh fruit (N=222):

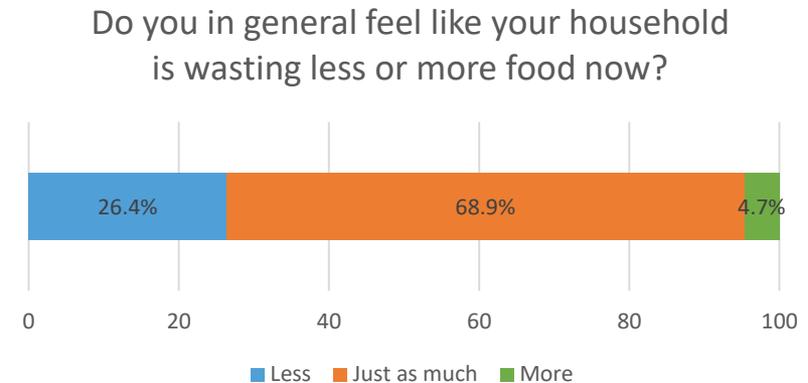
Reasons	%
1. I ate everything I bought	60.8
2. I only buy exactly what I need of this product now	32
3. I make use of easy-to-portion products	10.8

- Reasons discarding less meal leftovers (N=226):

Reasons	%
1. I ate everything I bought	43.8
2. I make use of easy-to-portion products	25.7
3. I only buy exactly what I need of this product now	17.3

# Food waste amounts [3]

- Food waste in general: about 26% indicates to waste less now (mean score 3.6)\*:



- Most important reasons

- Eating out (unexpectedly) less often (39%)
- Cooking at home more often, so leftovers can be used more easily the next day (34%)
- Cooking more precise (25%)

\* $p < 0.001$ , One sample t-test

7-point Likert scale, ranging from 'much less' to 'much more'

% less = scores 1-3, % just as much = score 4, % more = scores 5-7

# Meal leftovers

- About 23% of respondents has less meal leftovers now (70% just as much) as compared to before COVID-19 (mean score 3.7)\*
- Leftover handling barely changes. Small shift towards consuming leftovers later, instead of throwing them away:

Leftover handling	Before COVID-19	NOW	Difference
We throw away what is left	9.1%	7.5%	-1.6%
We save what is left and consume it later	56.1%	63.5%	7.4%
We save what is left and throw it away later	12.3%	6.2%	-6.1%
We feed it to animals	6.1%	6.3%	-0.2%
We never have leftovers	13.7%	14.1%	-0.4%
Other	2.6%	2.4%	0.2%

\* $p < 0.001$ , One sample t-test

# Motivation (M) & Abilities (A)

- 20% is more aware or pays more attention to food waste (**M**)\*
- About 25% thinks people in their surroundings find it more important now to avoid food waste (**M**)\* (*social norm*)
- 19% thinks people in their surroundings throw away less food now (**M**)\*
- 21% pays more attention to storing food in the right way and to use-by/best-before dates (**A**)\*
- 27% is trying out new recipes and cooking techniques more often now (**A**)\*

*7-point Likert scales per item, ranging from 'much less' to 'much more'*

*% less = scores 1-3, % just as much = score 4, % more = scores 5-7*

*\* $p < 0.001$ , One sample t-tests*

# Competing motives regarding food

- Competing motives regarding food that are more important now:
  - **Health** - more important for 31% (mean score 4.5)\*
  - **Taste** - more important for 23% (mean score 4.3)\*
  - **Having enough food** - more important for 24% (mean score 4.3)\*
  - **Food safety** - more important for 22% (mean score 4.3)\*
- Remarkable: no difference observed for how important 'price' is during COVID-19 period

*7-point Likert scales per item, ranging from 'much less' to 'much more'*

*% less = scores 1-3, % just as much = score 4, % more = scores 5-7*

*\* $p < 0.001$ , One sample t-tests*

# Opportunities (O)

- For about one third of the respondents (33%), unexpected circumstances leading to leftovers seem to occur less often now (●)\*
- Experiencing time pressure (~30%) seem to be less of a barrier (●)\* (for 14% this is more of a barrier now)
- A group of 25% feels less stressed and busy with housework (●) (for 17% this is more of a barrier now)

*7-point Likert scales per item, ranging from 'much less' to 'much more'*

*% less = scores 1-3, % just as much = score 4, % more = scores 5-7*

*\* $p < 0.001$ , One sample t-tests*

# Summary of results food waste behaviour

- **Food waste** in general: the majority (~70%) discards just as much foods as before COVID-19. About a quarter of households wastes less
- Main self-reported **reasons** for discarding less: less unexpected events (39%), cooking at home more often (34%), better use of left-overs (25%)
- ~ 20% is wasting less: **fresh vegetables, fresh fruit** and **meal leftovers**
- About a quarter of households has less **meal-leftovers**
- About 1/5<sup>th</sup> of households is more **aware** of food waste, and pays more attention to **storing** food in the right way and **use-by/best-before dates**
- For one third of respondents, **unexpected circumstances** leading to leftover foods seem to occur less often now

## 6. Conclusions

# Research hypotheses

The results show the confirmation of hypotheses as follows:

- H1: The **food waste amounts** of households are different from pre-COVID-19 = confirmed
- H2: The **shopping** behaviour of households is different from pre-COVID-19 = confirmed
- H3: The **preparation** behaviour of households is different from pre-COVID-19 = confirmed
- H4: The **storing** behaviour of households is different from pre-COVID-19 = confirmed
- H5: The **discard behaviour** of households is different from pre-COVID-19 = confirmed
- H6: The **Motivation, Ability and Opportunity** (MOA) of households related to food waste is different from pre-COVID-19 = confirmed

# Overall conclusions

- The COVID-19 crisis affects shopping, storing, preparation and food waste behaviour of Dutch households
- A quarter of Dutch households self-report to waste less food under the COVID-19 lockdown measures
- This can be explained by a better planning, cooking at home more often, better overview of stockings, less left-overs, more awareness regarding food waste and less unforeseen events leading to leftovers
- These insights can be helpful to guide future food waste reduction interventions

# Research team

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