# Food Loss and Waste Data Viewer

Developed by Jensen and Kritin - Group 170

# Overview – How does our Web Application address the social challenge?

The social challenge outlined is Investigating food loss and waste. That is, to "help various key parties in the food supply chain (including consumers and policy makers) explore unbiased information on the sources of food loss and waste over an extended period time."

Our application – the **Food Loss and Waste Data Viewer** addresses this challenge by providing a site where users can view data on this topic according to their own specifications such as:

- Loss and waste by food group/commodity.
- Loss and waste by location(Country and Region)

And allows the user to gather a **'Surface-level' view** of the data, which displays the data in a table, and an **'In-depth' view** which displays similar Countries or Food Commodities to the one selected by the user.

These two different views on the data allows us to enable our **Personas** to satisfy their **Needs and Goals.**

# Personas

**Name:** Marc Sampson

**Age:** 41

**Gender:** Male

**Ethnicity:** Caucasian

**Background:** Member of the Australian Parliament, his key role is to create and propose legislation in hopes of getting it passed. Is a member of the Australian Greens political party.

**Needs and Goals:** Marc is developing a new piece of legislation which is aimed at reducing Food loss and Waste in Australia. For this, he needs to view and assess accurate data about food loss. Marc aims to present this information to parliament, so he also requires visual representations of the data such as charts and diagrams. A key pain point for Marc is verifying the sources of data presented. Much information is provided without a source or with outdated sources. Marc is looking to view information both in and beyond the surface level, such as general data on the percentage of food loss across the country, and highly specific data such the type of food and industry contributing to this issue the most.

**Skills and Experience:** Marc has intermediate computer skills and is proficient with tools like Word and Excel. Marc has experience utilising statistical data to inform policy making.

**Name:** Sandra Ellison

**Age:** 45

**Gender:** Female

**Ethnicity:** Caucasian

**Background:** Sandra is a Sustainability Manager for a Supermarket chain. Her role involves assuring that the company is complying with legal and company-set sustainability practices and working towards sustainability goals.

**Needs and Goals:** Sandra is looking to present in a company meeting the supermarket chains statistics on food loss and waste in comparison with the statistics nationwide. To achieve this, Sandra needs to find data relevant to the company and its associated industries. This is a part of Sandra's goal of contributing to the company's ongoing effort to comply with sustainability practices. A key pain point of previous presentations is trying to explain in depth complex statistics to a less knowledgeable audience. To combat this, Sandra needs to find surface level and in-depth data on food loss and waste to present to a range of audiences.

**Skills and Experience:** Sandra has intermediate Computer skills and is experienced in creating digital presentations. Sandra has limited experience working with statistical data and has little to no skill with the associated tools used to view manipulate said data such as Excel.

**Name:** David Reiner

**Age:** 45

**Gender:** Male

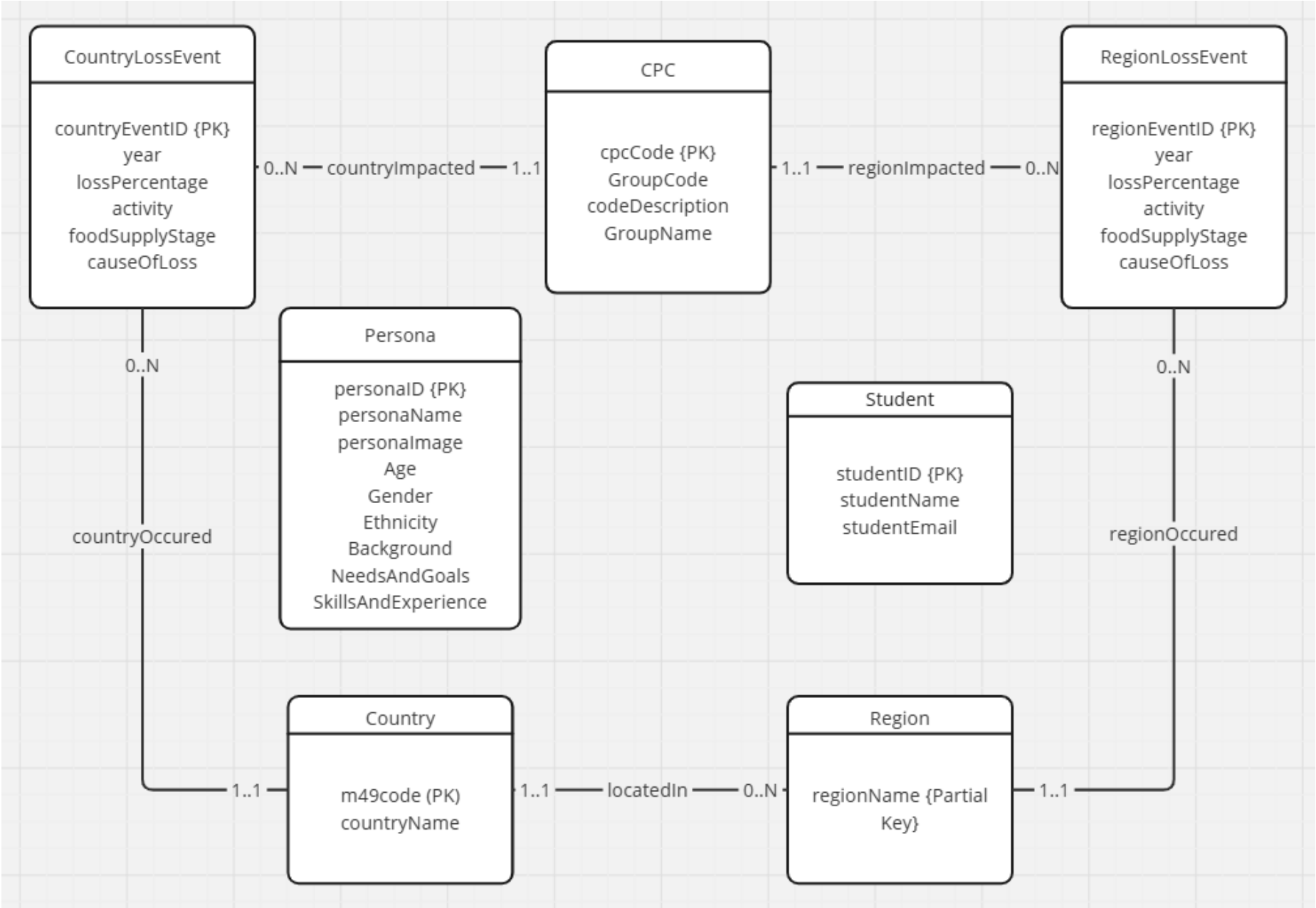
**Ethnicity:** German-Australian

**Background:** David is a manager in a retail company. He is well educated, has a family of 2 kids (Jane and John) and a wife (Megan). Although he is not good at technology, he is willing to learn new things if it is beneficial for his workplace and company. David also wants to spend more time with his family as he is usually busy with work.

**Needs and Goals:** David's company is facing a huge loss of food as many of it is spoiled during the storing process and he is trying to locate which storage is having problems to resolve the issue. David needs a reliable recently updated source of information where he can use to find out which area is having problems so that he can work on from that. Besides minimising the loss, David also aims to increase the profits of the company. Having an easy-to-use and informative website would also help David to finish his work earlier so that he has more time to spend with his beloved family.

**Skills and Experience:** He knows how to read statistical data and graphs. Although he is not very proficient in technology, David is willing to learn new things so a consistent and easy to understand UI design is preferred.

# ERD:


CountryLossEvent
countryEventID {PK}
year
lossPercentage
activity
foodSupplyStage
causeOfLoss
0..N
countryImpacted
1..1
CPC
cpcCode {PK}
GroupCode
codeDescription
GroupName
1..1
regionImpacted
0..N
RegionLossEvent
regionEventID {PK}
year
lossPercentage
activity
foodSupplyStage
causeOfLoss
0..N
countryOccured
Persona
personaID {PK}
personaName
personaImage
Age
Gender
Ethnicity
Background
NeedsAndGoals
SkillsAndExperience
Student
studentID {PK}
studentName
studentEmail
0..N
regionOccured
1..1
Country
m49code (PK)
countryName
1..1
locatedIn
0..N
Region
regionName {Partial Key}
1..1

# Database Schema

- **CPC** (cpcCode, GroupCode, codeDescription, GroupName)
- **CountryLossEvent** (countryEventID, year, lossPercentage, activity, foodSupplyStage, causeOfLoss, m49code*, cpcCode*)
- **RegionLossEvent** (regionEventID, year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode*)
- **Country** (m49code, countryName)
- **Region** (regionEventID*, m49code*, regionName)
- **Persona** (personaID, personaName, personaImage, Age, Gender, Ethnicity, Background, NeedsAndGoals, SkillsAndExperience)
- **Student** (studentID, studentName, studentEmail)

# Implemented Database - 3rd Normal Form

Our Implemented Database is normalised to **3rd Normal Form** as:

- Every table in our database is in 2NF
- In every table, all non-key values are directly dependent on the primary key, and not transitively dependent on the primary key.

## Functional Dependencies

CpcCode ---> GroupCode, codeDescription, GroupName

countryEventID --> year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode]

regionEventID --> year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode

m49code --> countryName

regionEventID --> m49code, regionName

personaID -> personaName, personaImage, Age, Gender, Ethnicity, Background, NeedsAndGoals, SkillsAndExperience

studentID --> studentName, studentEmail


# Page 1A

## 'BIG PICTURE' CONTENT

# Level 1A - Landing Page

**The Landing Page** of our website aims to:

- Immediately capture the attention of the user
- Provide a **snapshot** of the data provided by our site
- Direct the user to a **tutorial** on how to use the site

**The way we achieve this**:

- Background Image
- Table Snapshot of Data
- 'View Instructions' button takes user to 'About Us' page

# Level 1A - UX & UI

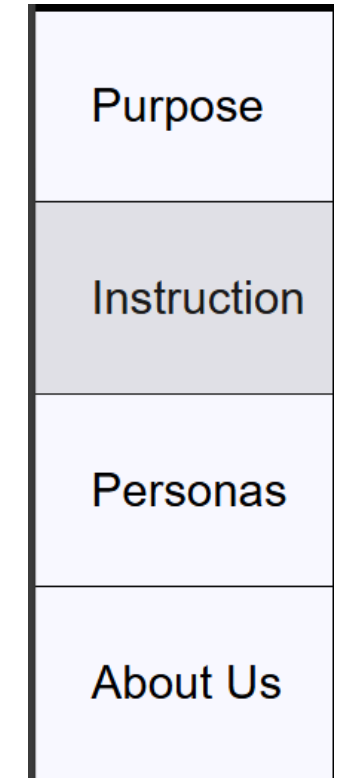
The UI of the homepage displays simplicity, which is necessary to cater to the differing levels of technological proficiency within our Personas.


The Navigation Bar above displays this - with an escape hatch at the top left which will bring the user to the homepage. All the pages on the left of the nav bar are displayed with simple labels, and the page that the user is currently on is coloured green. This is done to satisfy the Recognition rather than Recall heuristic. This bar is consistent throughout the whole application.


The landing page aims to present a minimalist design, avoiding unnecessary elements so that users immediately understand the purpose of the website and are naturally directed to the instructions page.
The snapshot gives aims to give the user an idea of what kind of data is accessible through the other pages.

# Level 1B - UX & UI

The Side Bar on the left of the mission page helps users navigating throughout the page more fluidly and efficiently by automatically scroll to the selected section, satisfying UX Flexibility and Efficiency Design Heuristic.




**Name:** Marc Sampson

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**Skills and Experience:** Marc has intermediate computer skills and is proficient with tools like Word and Excel. Marc has experience utilising statistical data to inform policy making.

The mission page also have a "Persona" section containing the information of our Personas. Each persona have their own "panel" dedicated to each of them. User can view different personas in multiple ways, by clicking at the three dots on the bottom of the section or using the horizontal scroll bar.


# Page 2A

## 'SHALLOW GLANCE' OF DATA

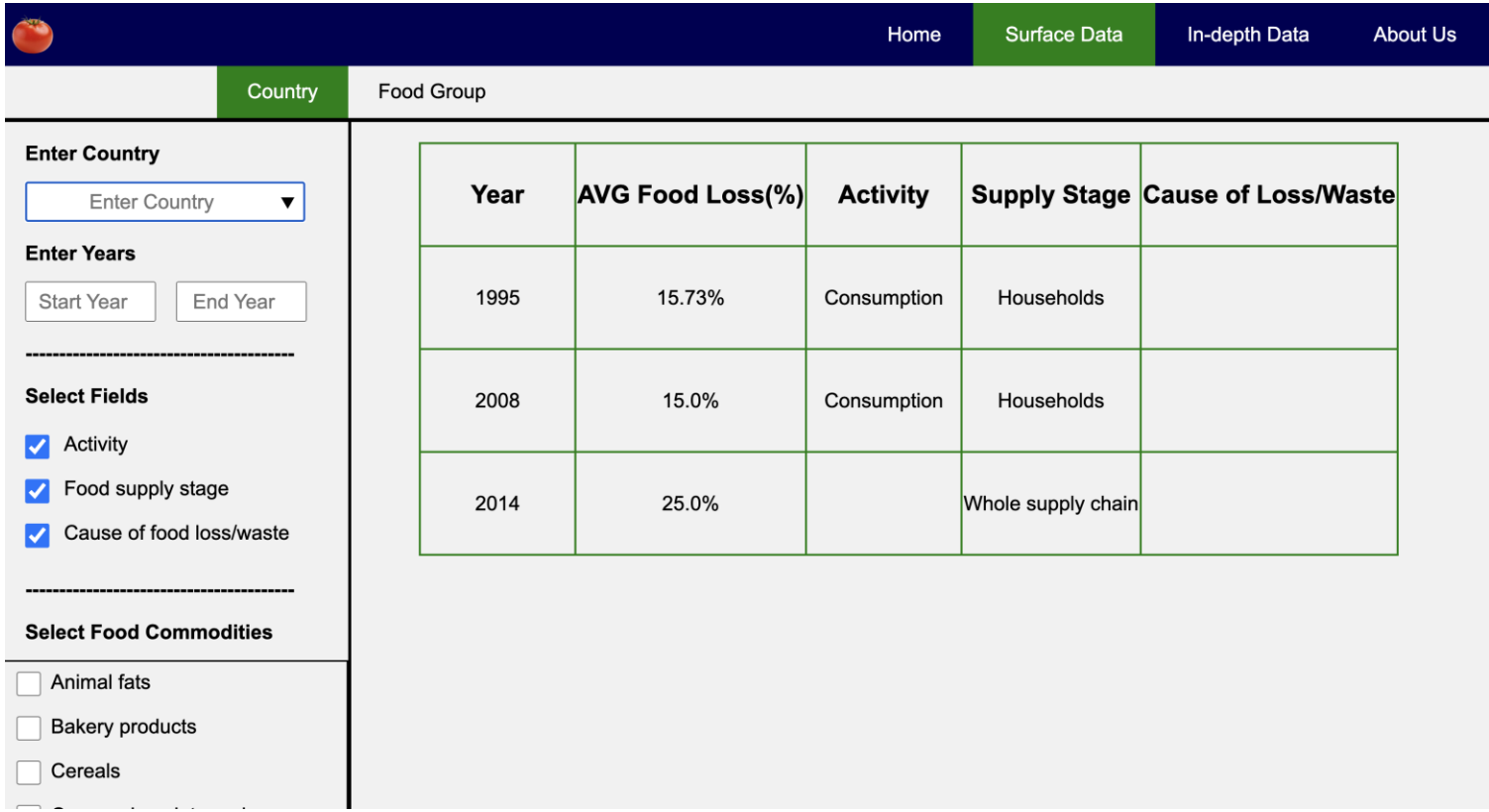
# Level 2A - Focused view of Loss/Waste by Country

Our **level 2A** page aims to:

- Present food loss/waste data for a user selected Country
- Allow the user to specify the year range of the data
- Allow the user to select the food groups which are included in the calculation
- Allow users to select the fields and the sorting type of the output

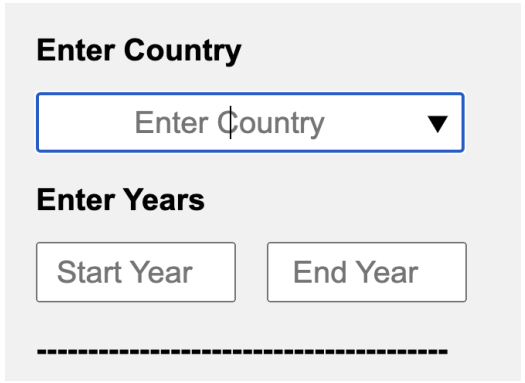
**The way we achieve this:**

- Output a table, each row representing a year and avg loss
- Sidemenu
- Dropdown menu (Country)
- Checkboxes (Fields + Commodities)

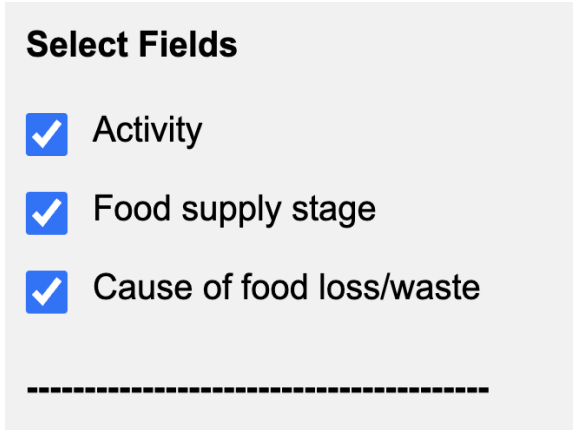


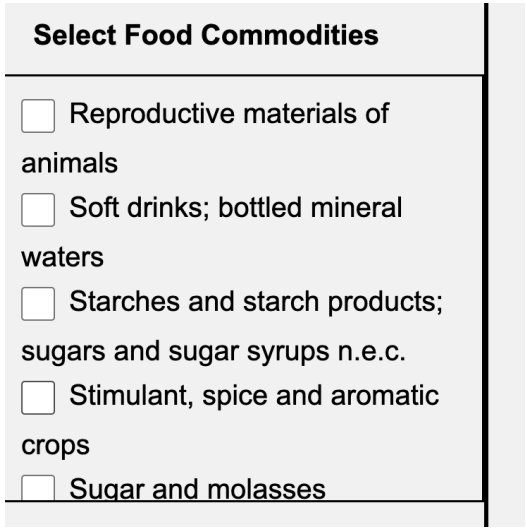
# Level 2A - UX & UI

The input fields in the side menu are immediately highlighted when loading the page.

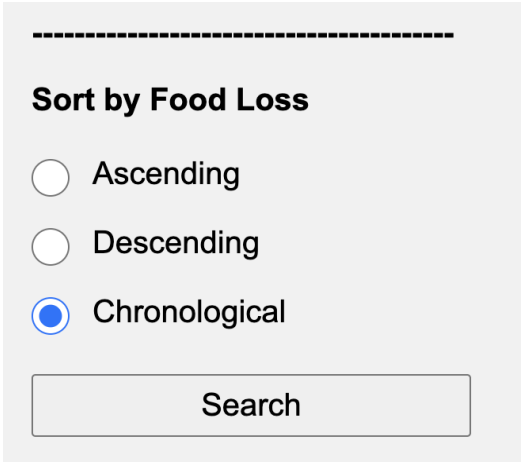



Fields are also all selected by default, as users usually selected all of them anyway.



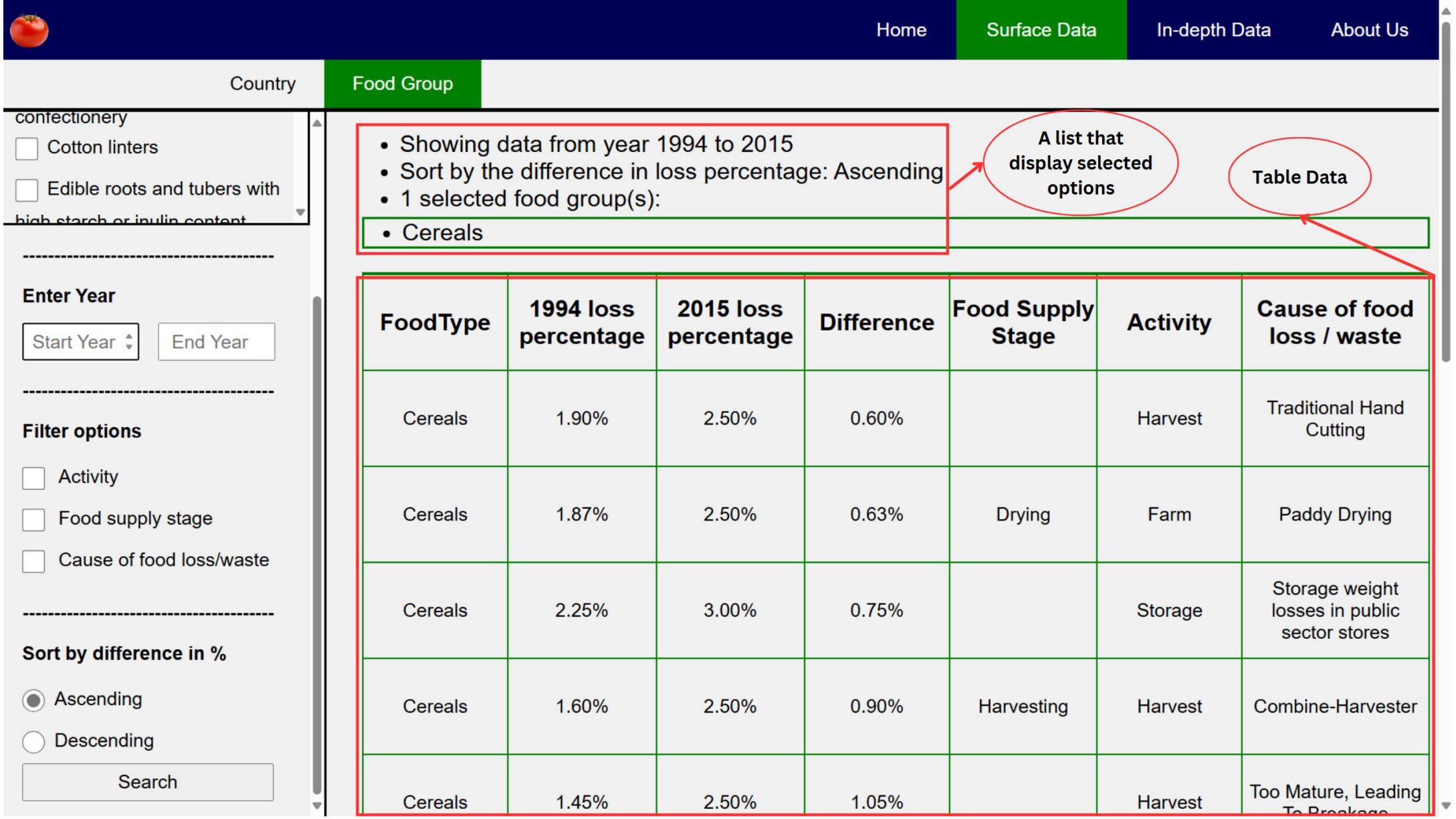

Food Commodity Checkboxes have their own scrollable menu to decrease the amount of space side menu takes up.




Sorting Radio Buttons and Search button to get results


# Page 2B

## FOCUSED VIEW OF LOSS/WASTE BY FOOD GROUP




# Page 2B

## FOCUSED VIEW OF LOSS/WASTE BY FOOD GROUP

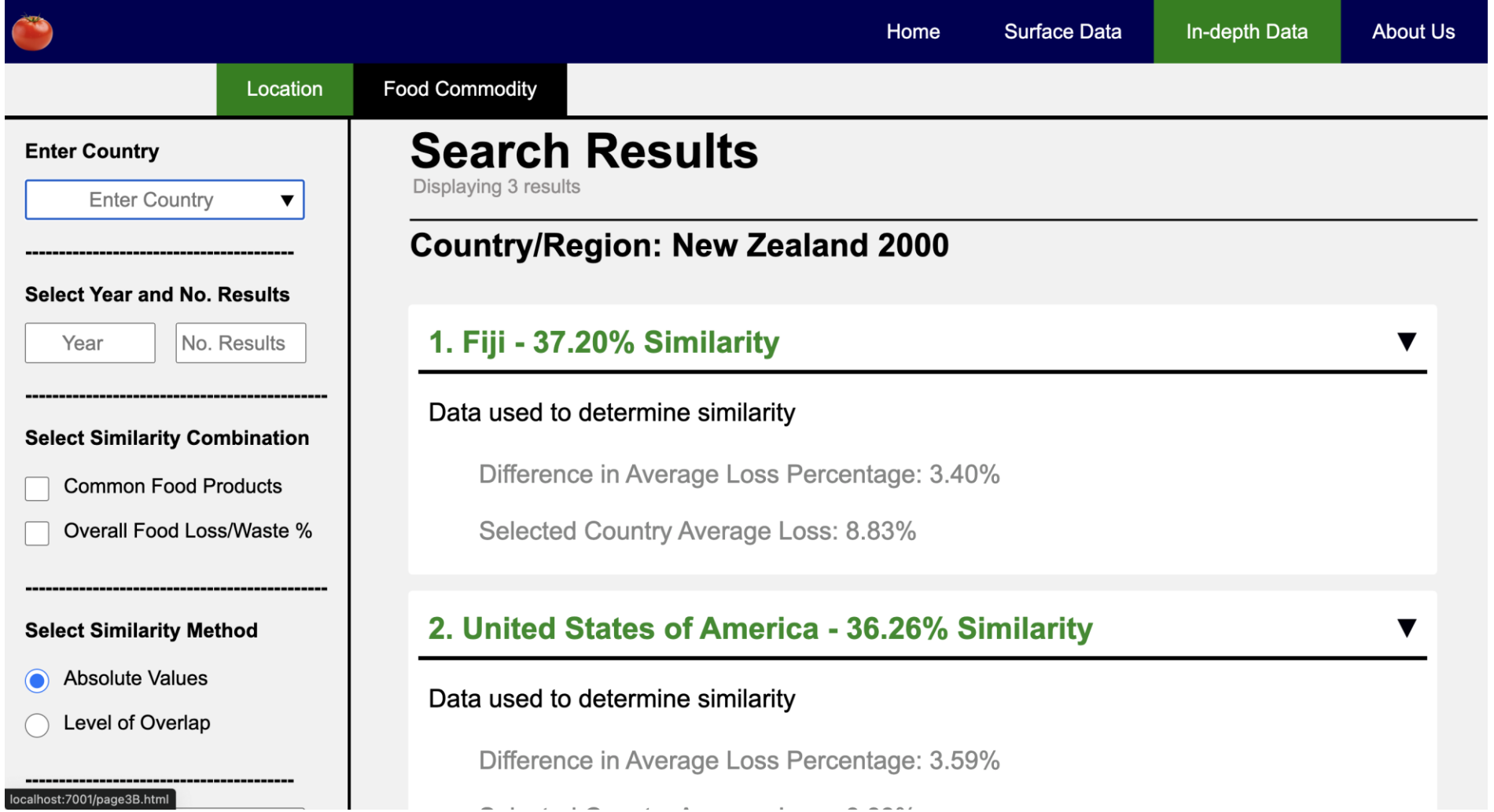
# Subtask 2B

Query Used:

## For getting data for the table:

```
SELECT DISTINCT t1.GroupName, t1.year, AVG(t1.lossPercentage) AS startPercentage, t2.year,
AVG(t2.lossPercentage) AS endPercentage, ABS(AVG(t2.lossPercentage) - AVG(t1.lossPercentage) )
AS diff, t1.foodSupplyStage, t1.activity, t1.causeOfLoss
FROM (CPC JOIN CountryLossEvent ON CPC.cpcCode = CountryLossEvent.cpcCode) AS t1
INNER JOIN CountryLossEvent AS t2 ON t1.cpcCode = t2.cpcCode
WHERE t1.year = 1994 AND
        t2.year = 2015 AND
        t1.GroupName = 'Cereals' AND
        t1.causeOfLoss != ''
GROUP BY t1.causeOfLoss
ORDER BY diff ASC;
```

Note: Filters priority: Cause Of Loss > Activity > Food Supply Stage




# Page 3A

## 'DEEP-DIVE' OF THE DATA

# Level 3A - Locations with similar loss/waste percentages

In our level 3A page we aimed to:

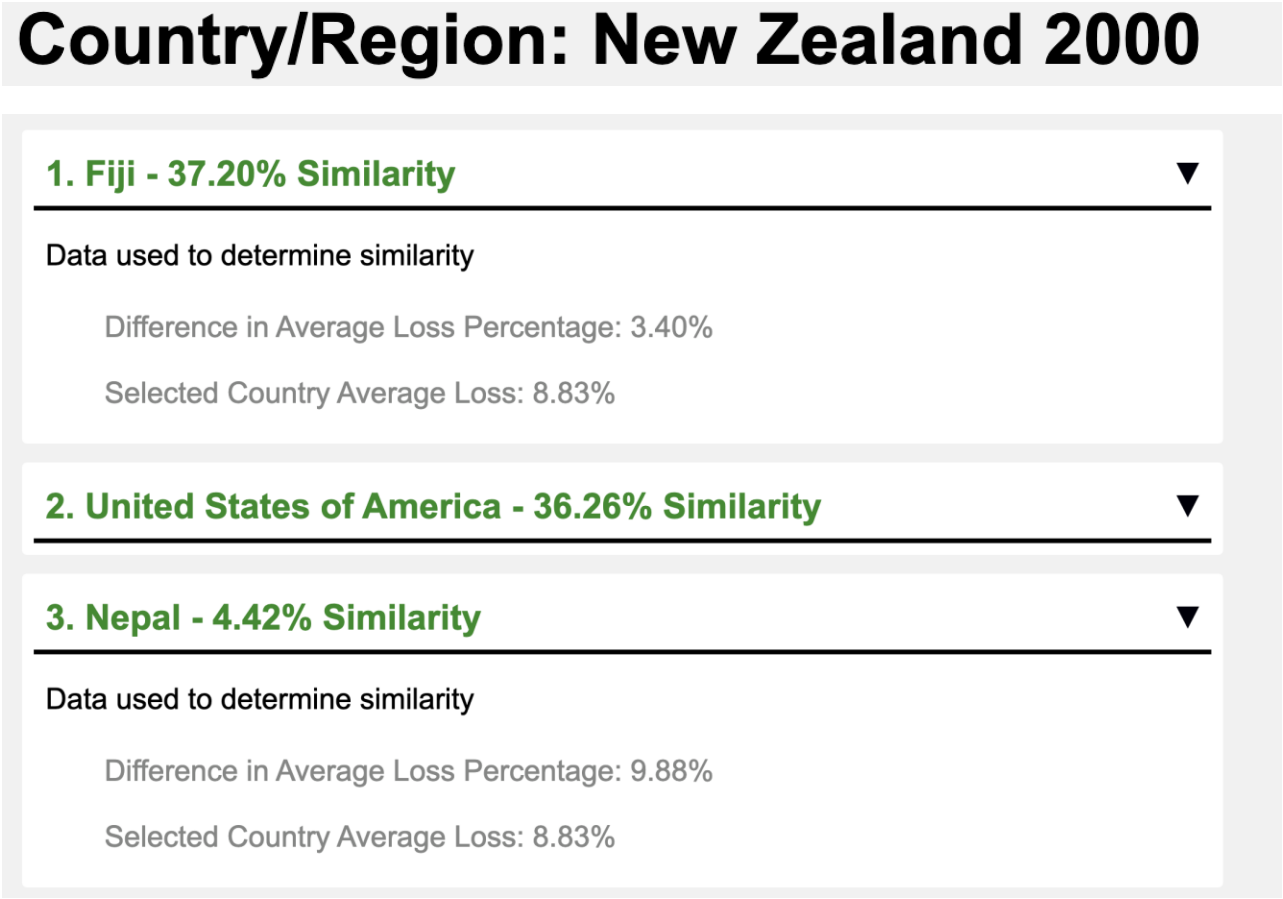
- Allow users to select a country, year and number of results
- Select a similarity combination and method
- Display the most similar countries a nd a similarity rating

**The way we achieve this:**

- An 'Accordion' style display to select each similar country and other info
- Input fields for Country (dropdown), year and results
- Checkboxes for combination
- Radio buttons for method

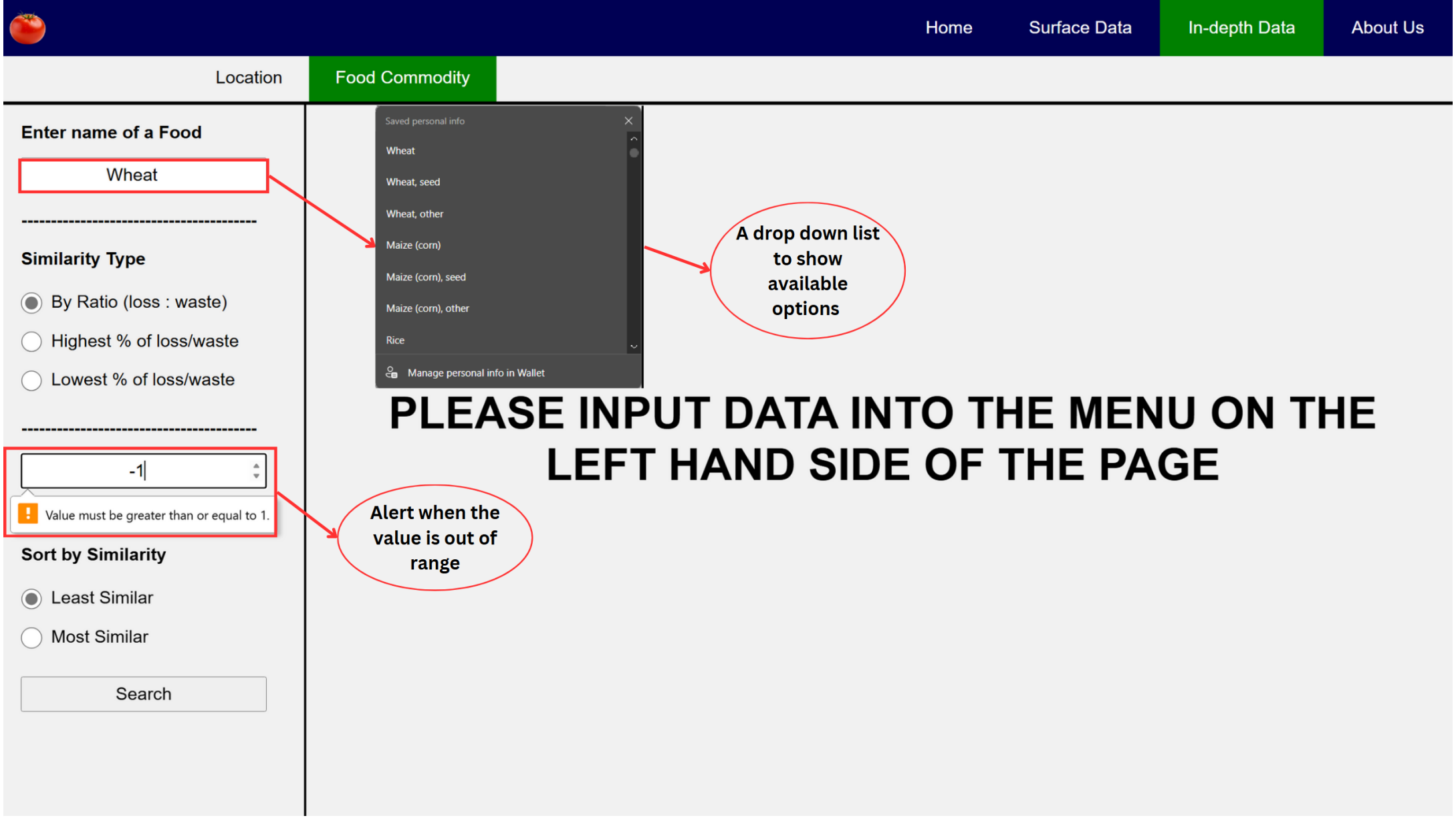
# Level 3A - UX & UI

By displaying the number of results retrieved, we help the user by reducing their memory load.

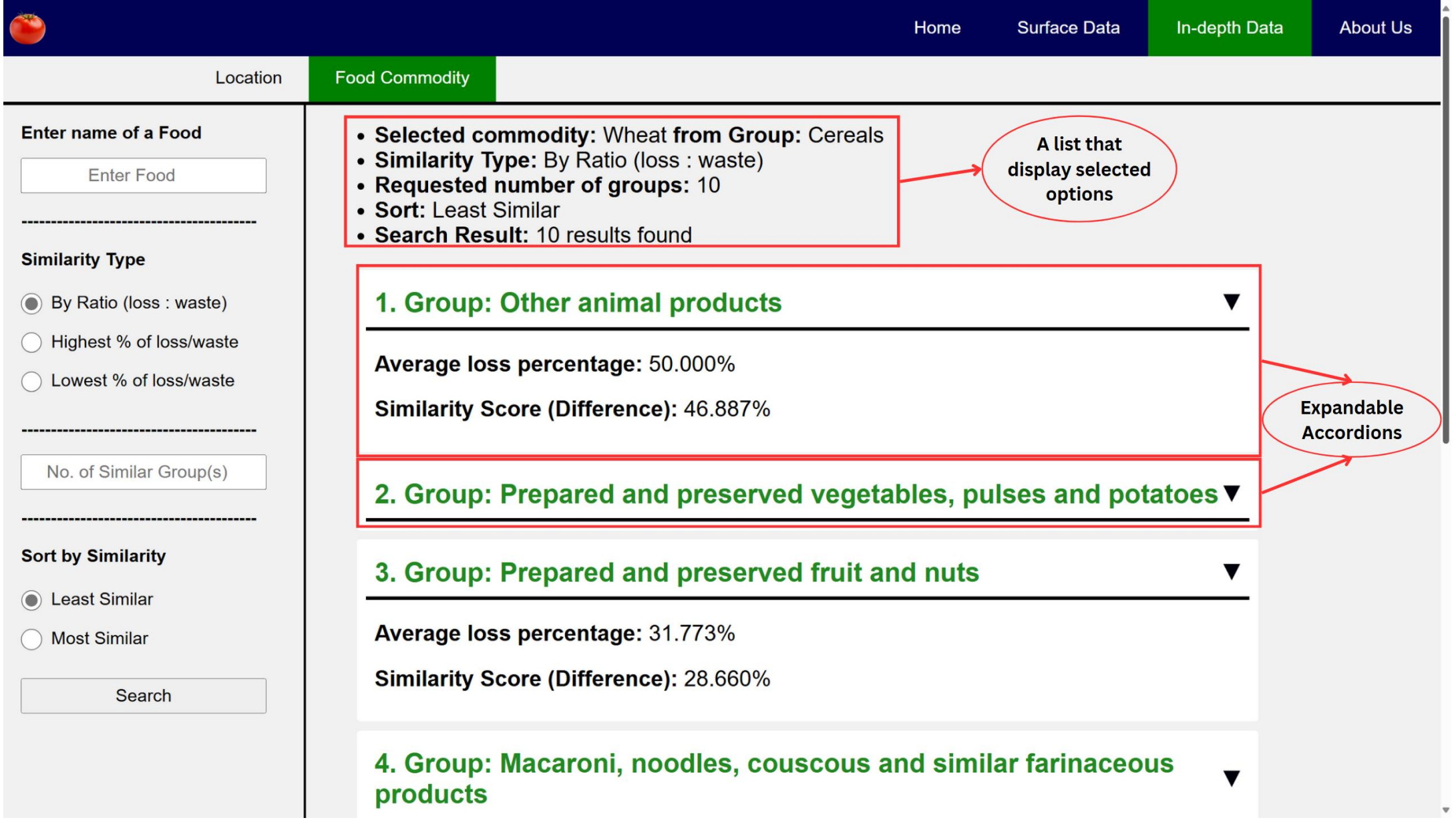

Similarly, we display the country and the year that the results are being compared to.

Each Accordion display is expandable providing users to have a simple or detailed view of the data, depending on their needs. The un-expanded view displays the country, its ranking and the similarity score. The expanded view displays the data used to determine the similarity
This is done to satisfy the flexibility and efficiency of use heuristic.




# Page 3B

## FOCUSED VIEW OF LOSS/WASTE BY FOOD - COMMODITY




# Page 3B

## FOCUSED VIEW OF LOSS/WASTE BY FOOD - COMMODITY

# Subtask 3B

## Query Used:

### For getting data for the accordion

- The red underlines indicates which line will be changed based on user's input.
- ABS(gs.avg_loss_percentage - sg.avg_loss_percentage) can be also be **max_loss_percentage** or **min_losspercantage** instead of **avg_loss_percentage** based on selected similarity type

```
WITH CommodityGroup AS (
    SELECT c.GroupCode, c.GroupName, f.cpcCode, c.codeDescription
    FROM CountryLossEvent f
    JOIN CPC c ON f.cpcCode = c.cpcCode
    WHERE c.codeDescription = 'Wheat'
    LIMIT 1
),
GroupStatistics AS (
    SELECT c.GroupCode, c.GroupName,
           MAX(f.lossPercentage) AS max_loss_percentage,
           MIN(f.lossPercentage) AS min_loss_percentage,
           AVG(f.lossPercentage) AS avg_loss_percentage,
           MAX(f.cpcCode) AS max_loss_cpc_code,
           MIN(f.cpcCode) AS min_loss_cpc_code
    FROM CountryLossEvent f
    JOIN CPC c ON f.cpcCode = c.cpcCode
    GROUP BY c.GroupCode, c.GroupName
),
GroupStatisticsWithDetails AS (
    SELECT gs.*,
           (SELECT cp.codeDescription
            FROM CPC cp
            WHERE cp.cpcCode = gs.max_loss_cpc_code) AS max_loss_commodity,
           (SELECT cp.codeDescription
            FROM CPC cp
            WHERE cp.cpcCode = gs.min_loss_cpc_code) AS min_loss_commodity
    FROM GroupStatistics gs
),
SelectedGroupStatistics AS (
    SELECT * FROM GroupStatisticsWithDetails
    WHERE GroupCode = (SELECT GroupCode FROM CommodityGroup)
)
SELECT gs.GroupCode, gs.GroupName,
       gs.max_loss_percentage, gs.min_loss_percentage, gs.avg_loss_percentage,
       gs.max_loss_commodity, gs.min_loss_commodity,
       ABS(gs.avg_loss_percentage - sg.avg_loss_percentage) AS similarity_score
FROM GroupStatisticsWithDetails gs
JOIN SelectedGroupStatistics sg
ORDER BY similarity_score DESC
LIMIT 10;
```

# Queries - 3A

## Ranking each Country:

```
AVG(ABS(P.lossPercentage - sc.lossPercentage)) AS avg_loss_diff
```

## Normalising difference:

```
(1 - (o.avg_loss_diff / (SELECT MAX(avg_loss_diff) FROM OtherCountriesLoss)))
```

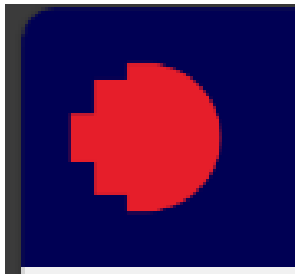
## Similarity Score:

```
(n.normalized_avg_loss_diff * 0.5 + (n.selected_country_avg_loss / 100) * 0.5)
```

# A Significant change

"The RMIT logo looks boring and not relevant to the topic"

## Before



## After

"There shouldn't be gaps between the buttons, the buttons should be larger in size"

## Before


## After

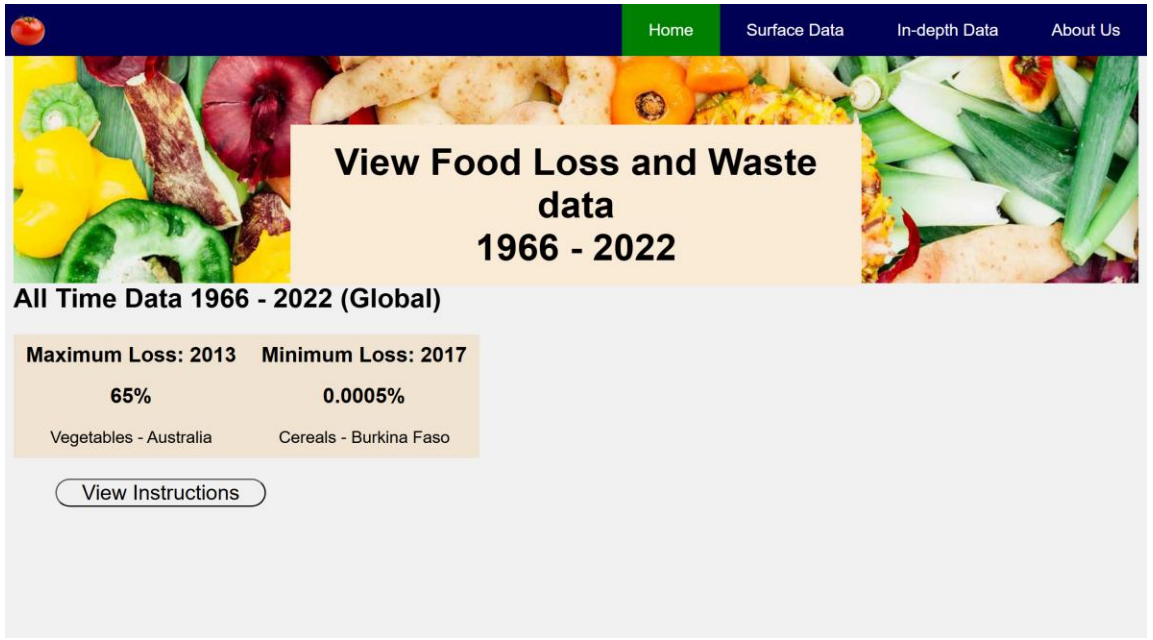
# Changes made on 1A

"The homepage looks very different to the other pages"

"I don't find the homepage visually appealing"

"Page feels empty"

**BEFORE:**




**AFTER:**

# Changes made on Level 2 and 3

"This page feels empty when we haven't made a search, put something in the middle of the page"

## Before



*(Yes, it was literally blank, there was nothing)*

---

## After

**PLEASE INPUT DATA INTO THE MENU ON THE LEFT HAND SIDE OF THE PAGE**

# Changes made on 2B

"The selected option should be in a
list, because it is hard to read if put in one line"

## Before

Showing data from year 1994 to 2015 | 1 selected food group(s): | Ascending

- Cereals

---

## After

- Showing data from year 1994 to 2015
- Sort by the difference in loss percentage: Ascending
- 1 selected food group(s):
  - Cereals

# Changes made on 3B

"The selected option should be in a
list, because it is hard to read if put in one line"

## Before

**Selected commodity:** Wheat **from Group:** Cereals | **Similarity Type:** By Ratio (loss : waste) | **Requested number of groups:** 10 | **Sort:** Least Similar

**Search Result:** 10 results found

---

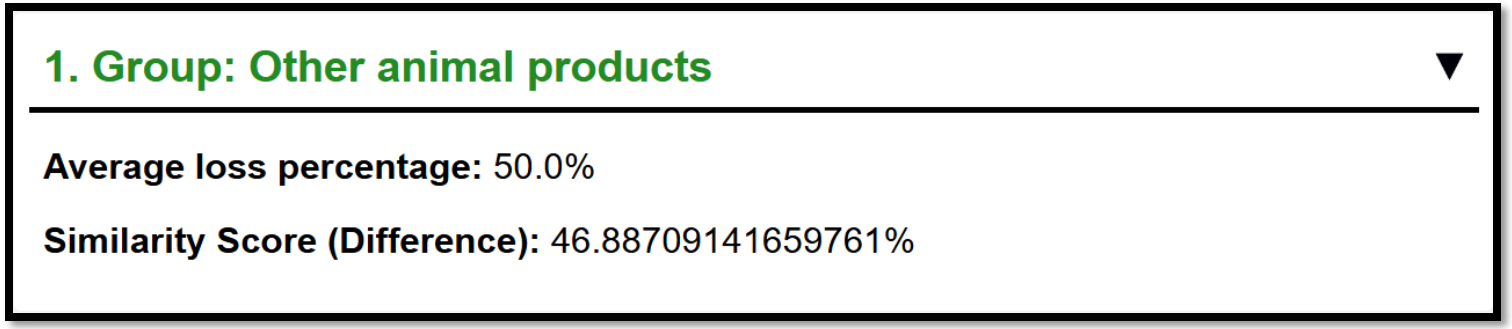
## After

- **Selected commodity:** Wheat **from Group:** Cereals
- **Similarity Type:** By Ratio (loss : waste)
- **Requested number of groups:** 10
- **Sort:** Least Similar
- **Search Result:** 10 results found

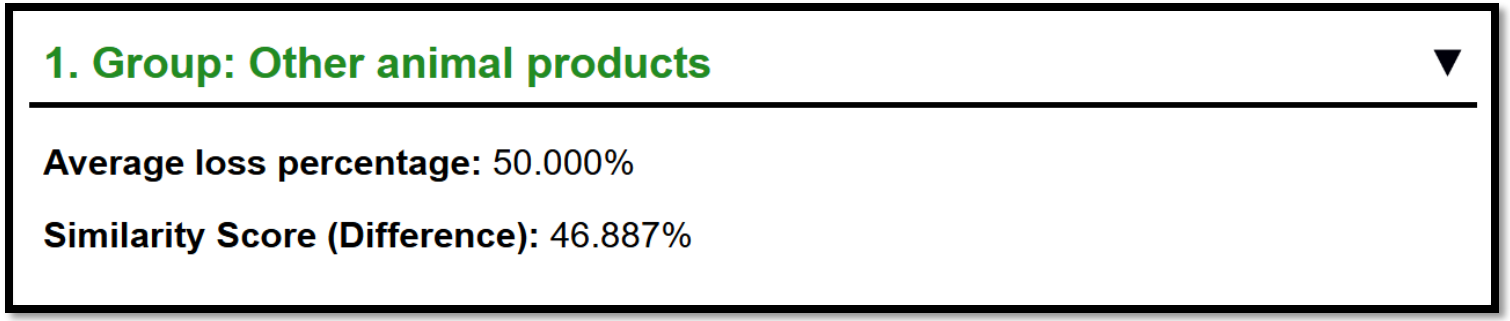
# Changes made on 3B

"Too many numbers!!!"

## Before




## After



# END OF PRESENTATION

Any Questions?