



European  
Snacks  
Association

# European Snacks Association

## ► Acrylamide mitigation in the European savoury snacks industry

5 September 2024



# Who we are

We represent snack producers and their suppliers – including ingredients, equipment, packaging, etc.



European  
Snacks  
Association



We cover more than 80%  
of the branded European  
savory snacks market



**200**  
MEMBER  
COMPANIES

OF ALL SIZES  
FROM OVER

**40**  
COUNTRIES



**HALF**  
of the members are  
small and medium  
size enterprises  
**SMEs**

★★★  
Sector retail value 2021  
**€30bn**  
Approx.



DIRECT EMPLOYMENT  
**40,000**  
PEOPLE

SHARE OF THE EUROPEAN  
FOOD AND BEVERAGES MARKET

**1.5%** An icon showing a fork, a knife, a plate, and a glass of orange liquid.

A red location pin icon. **APPROX. 100**  
production sites across the EU

# Key acrylamide guidance

- FoodDrinkEurope, with the support of the Commission published the Acrylamide Toolbox (first published 2005).
  - Current version published 2019.
  - 'One page' pamphlets also produced for key foods, including sliced potato crisps.
- The FAO/WHO Codex Alimentarius “Code of Practice for the Reduction of Acrylamide in Foods” (CAC/RCP 67-2009).
  - Current version published in 2009.
  - In April 2024 Codex agreed to start work on a revised version of the COP.
- In 2016 FDA in USA developed a 'Guidance for Industry' that outlines strategies to help growers, manufacturers, and food service operators reduce acrylamide in the food supply.
- In July 2024 China issued its own draft *National Food Safety Standard Code of Principle for The Control of Acrylamide Contamination in Food* and notified this to WTO

# Key acrylamide legislation (EU) – Current

- ❑ **Commission Regulation (EU) 2017/2158 of 20 November 2017 establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food.**
  - ❑ 'An elegant solution to a complex problem' [Prof Don Mottram].
  - ❑ Applies from April 2018.
  - ❑ Associated guidance also published by the Commission (on categories and implementation).
  - ❑ Sets mandatory mitigation measures for certain foods – based upon Toolbox.
  - ❑ Sets benchmark levels (BMLs) for certain foods – based upon EFSA database.
  - ❑ BMLs to be reviewed after 3-years.
  - ❑ 3rd party criticism that without MLs, this regulation was not enforceable – particularly for imported goods.
  
- ❑ **HOWEVER, Reg.178/2002 (General Food Law) still applies and since April 2018 there have been 46 RASFFs on acrylamide (14 of which were for potato or vegetable crisps) – showing that enforcement is possible and being undertaken.**
  
- ❑ **Commission Recommendation (EU) 2019/1888 of 7 November 2019 on the monitoring of the presence of acrylamide in certain foods.**
  - ❑ Increases the number of foods to be monitored – for possible inclusion in future legislation (includes cereal snacks [such as extruded maize and/or wheat products], rice crackers, maize crackers, roasted nuts, roasted oilseeds, vegetable crisps/fries).

# Data collection within the European savoury snacks industry 2002-2023



- Data on AA in sliced potato (*Solanum tuberosum*) crisps (chips) has been collected by individual companies since 2002.
- In 2013 ESA formalized the annual collection of occurrence data from within its membership.
- Minimum specifications for testing and data were agreed.
- Information was compiled by the ESA secretariat.
- Data was anonymised and submitted for statistical analysis to independent scientists and statisticians (Prof Don Mottram, Prof Nigel Halford, Dr Stephen Powers).
- Three peer review papers have been published covering the period 2002-2011, 2002-2016, and 2002-2019.

# Data collection within the European savoury snacks industry 2002-2023

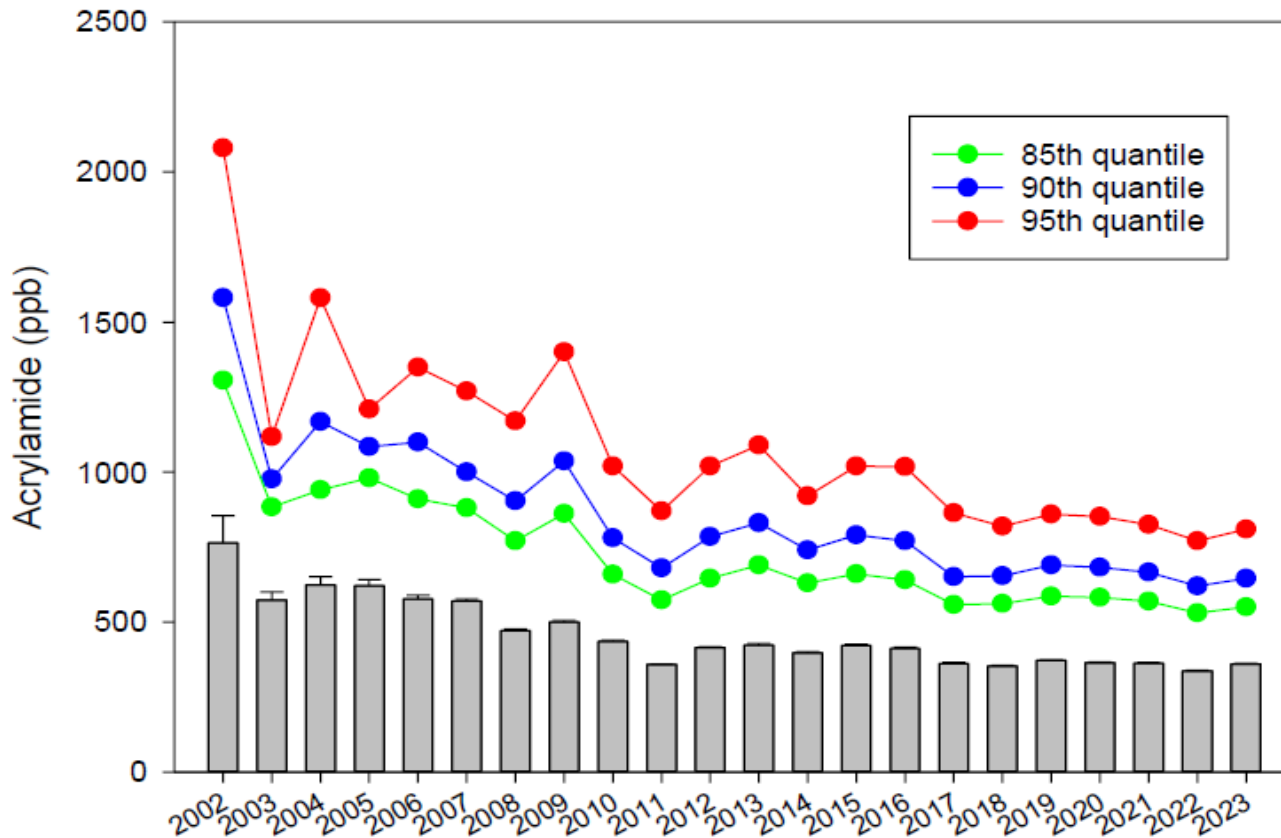


- Data has also been regularly submitted to EFSA, and several additional summary papers have been submitted to the European Commission.
- Believed to be the largest single data set relating to AA levels in sliced potato crisps in terms of scope, quantity and length.
- This data set currently includes:
  - 136 047 observations
  - 21 years period
  - 25 European countries\*
- Data was excluded where if there was a non-standard method reported, missing or incorrect data on LOD/LOQs, no accreditation, duplicate samples, non-European, incomplete description (limited amount of 'early' data).

\*Including UK, Switzerland and Norway. No data from Estonia, Luxembourg, Malta and Slovenia).

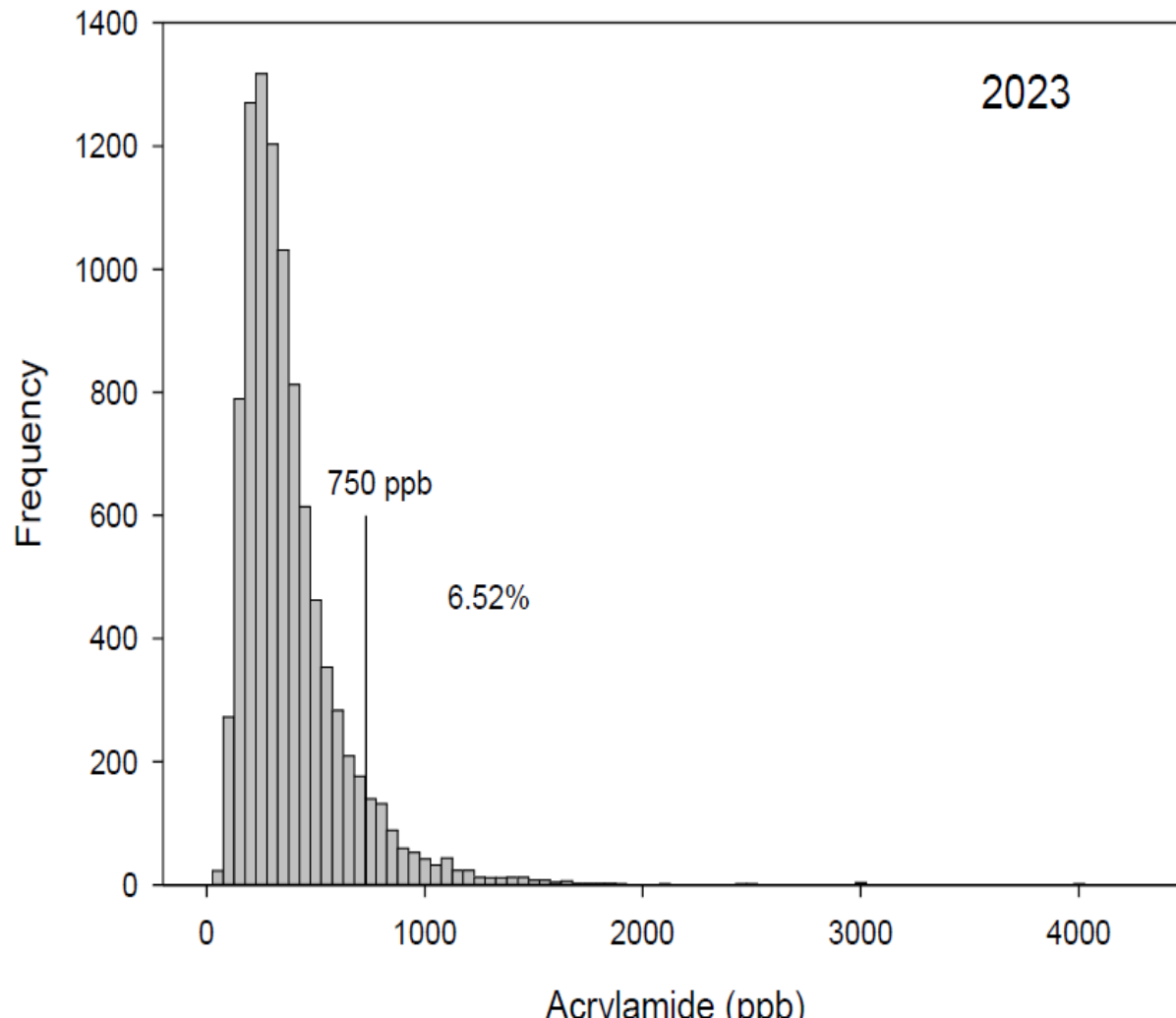
# Sliced potato crisps 2002-2023 data

Means, SEs, 85th, 90th and 95th quantiles



- ❑ 9 592 observations for 2023 with a mean of  $360.6 \pm 2.57$  ppb
- ❑ 6.5% of observations were greater than the BML in 2023.
- ❑ 6% of observations were greater than 1000 ppb and only 0.17% of observations were greater than 2000 ppb in 2023.
  - Q85 was 550 ppb
  - Q90 was 645 ppb
  - Q95 was 809 ppb, above the BML (750 ppb).

# Sliced potato crisps 2023 data

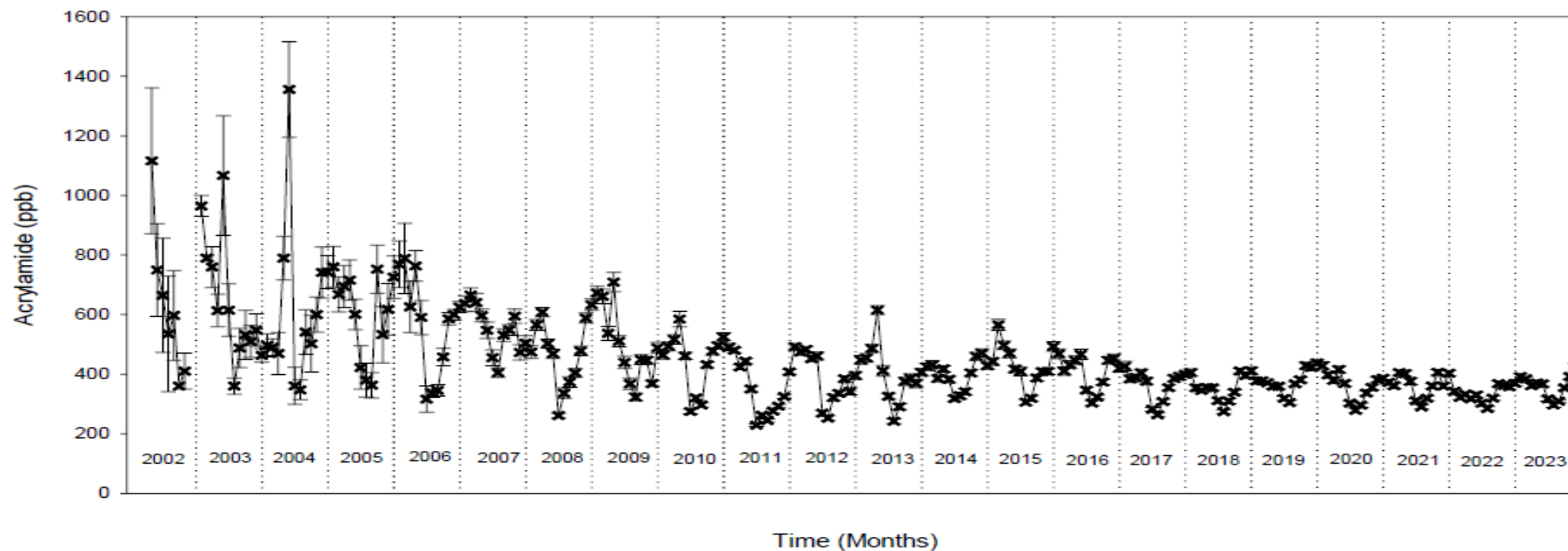


- ❑ The histogram for 2023 shows where the 6.52% of observations greater than 750 ppb are positioned
- ❑ 9 observations greater than or equal to 2500 ppb:
  - 2515 (November)
  - 4300, 3800, 2500 (December)
  - 2688, 2618 (January)
  - 2786 (February)
  - 3572 (March)
  - 2500 (August)
- ❑ Apart from the observation in August, the corresponding samples for these observations were likely obtained from stored potatoes.

# Sliced potato crisps Seasonality 2002-23 data

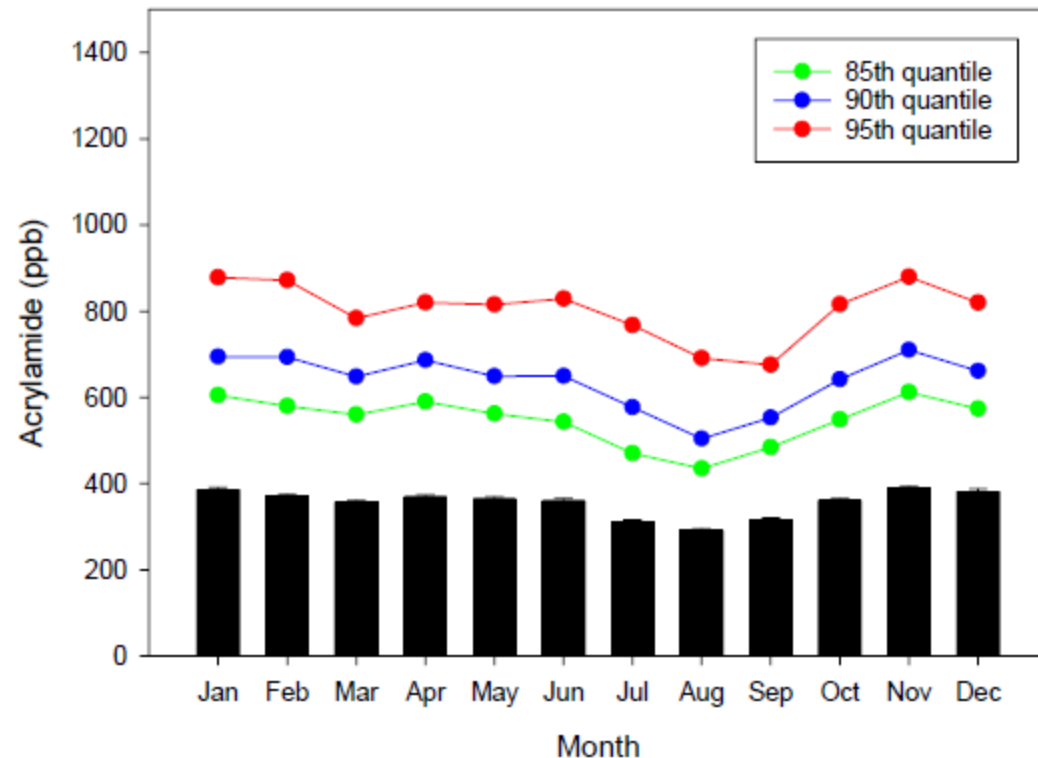
## Seasonality

The overall trend in acrylamide over 2002-2023 is shown in the graph below, plotting monthly means  $\pm$  SEs. Within each yearly section, the reduction in acrylamide in the summer months is seen, creating the cyclical pattern.



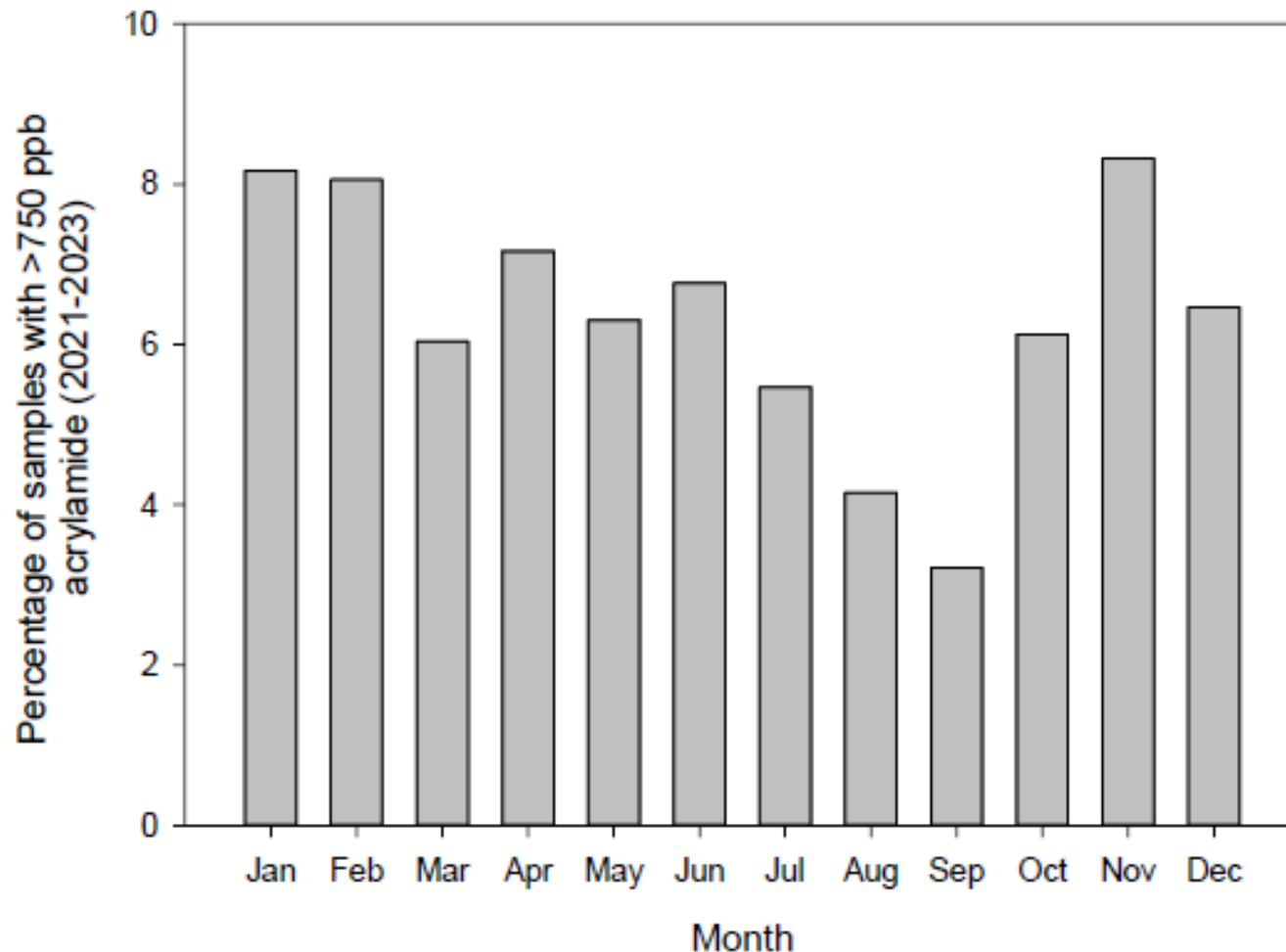
# Sliced potato crisps Seasonality 2021-23 data

Seasonality 2021-2023: months



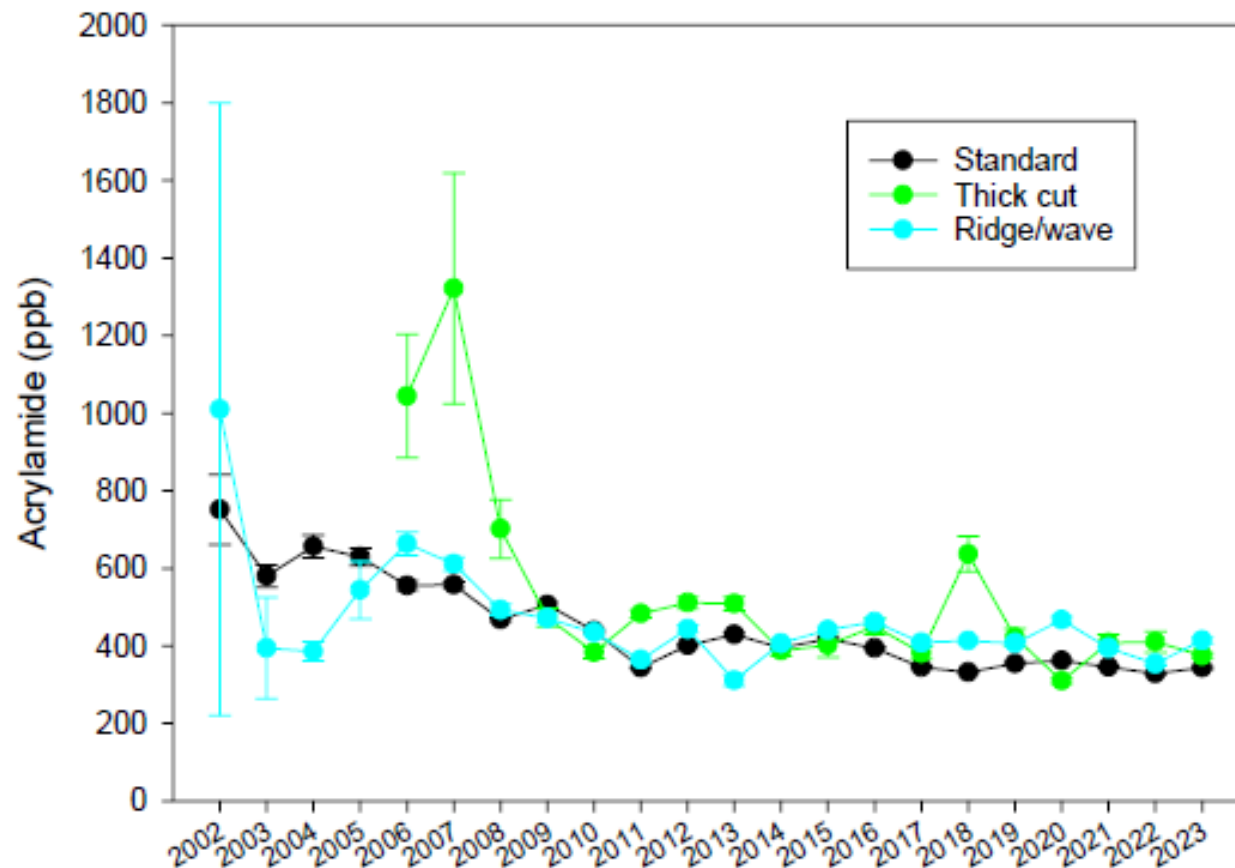
- Highly variable natural raw material limits the ability to control acrylamide levels entirely.
- Seasonality is an unavoidable influence: acrylamide is lower in summer and relatively higher in winter, due to longer-term potato storage.
- Raw materials variability causes year-on-year variability and outliers.

# Sliced potato crisps Seasonality 2023 data only



- Percentages of samples over the current 750 ppb BML by month
- Complexity of issue increased by different growing and storage seasons in different regions.

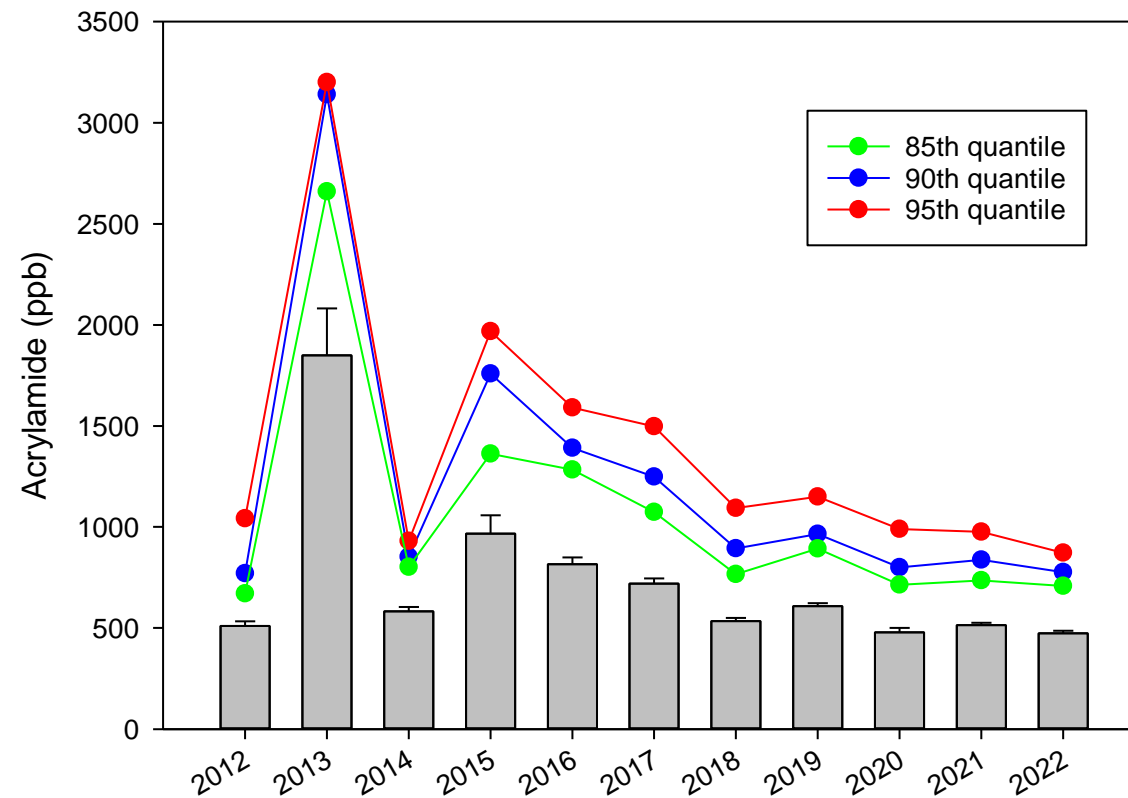
# Impact of different cuts on AA levels



- Impact of the cut of the potato crisp has also been explored.
- Theorised that thicker cut/ridged or waved slices may take longer to fry to the same moisture level as a standard cut.
- Does appear to be some issues, but these seem to have been managed and levels are similar, (although generally higher for these alternative cuts).

# Subset of data: Potato sticks 2012-2022

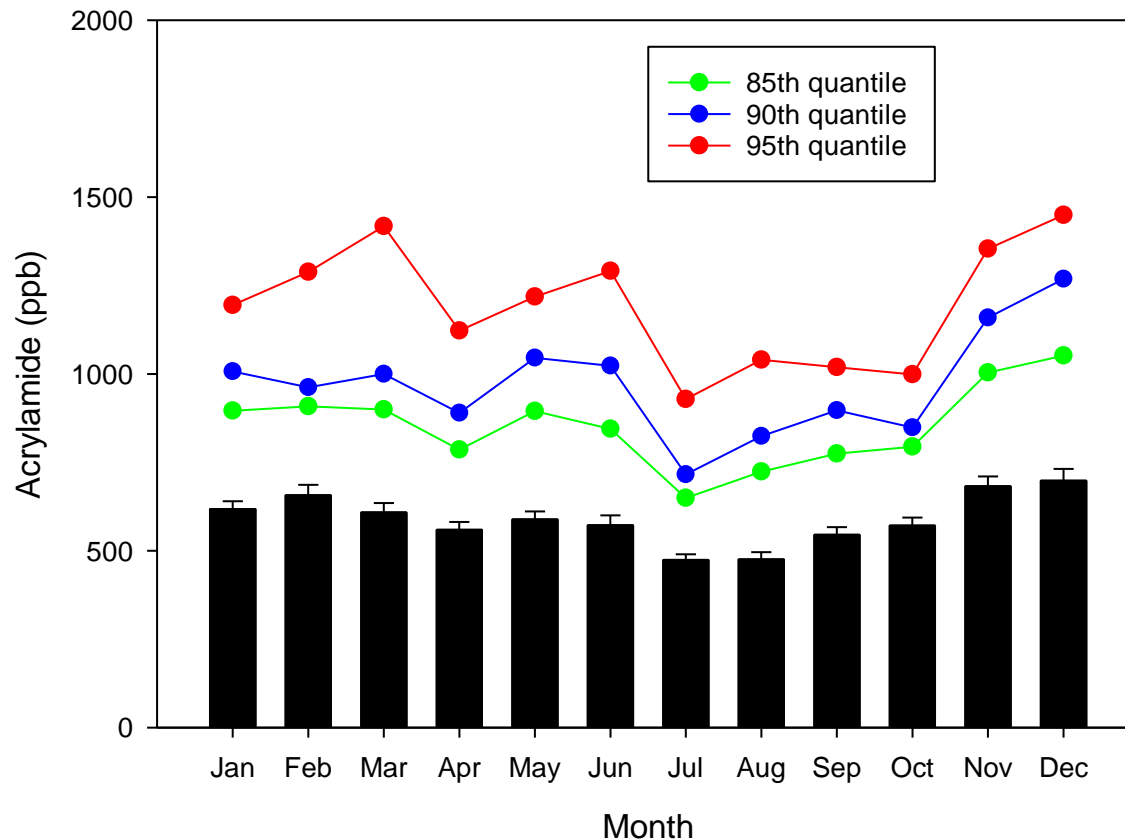
Potato Sticks: Means, SEs, 85th, 90th and 95th quantiles



- ❑ Theorised that potato sticks and lattice slices have a greater surface to volume area, and that non-conforming products are more difficult to spot and extract from end of line.

# Potato sticks 2022 data

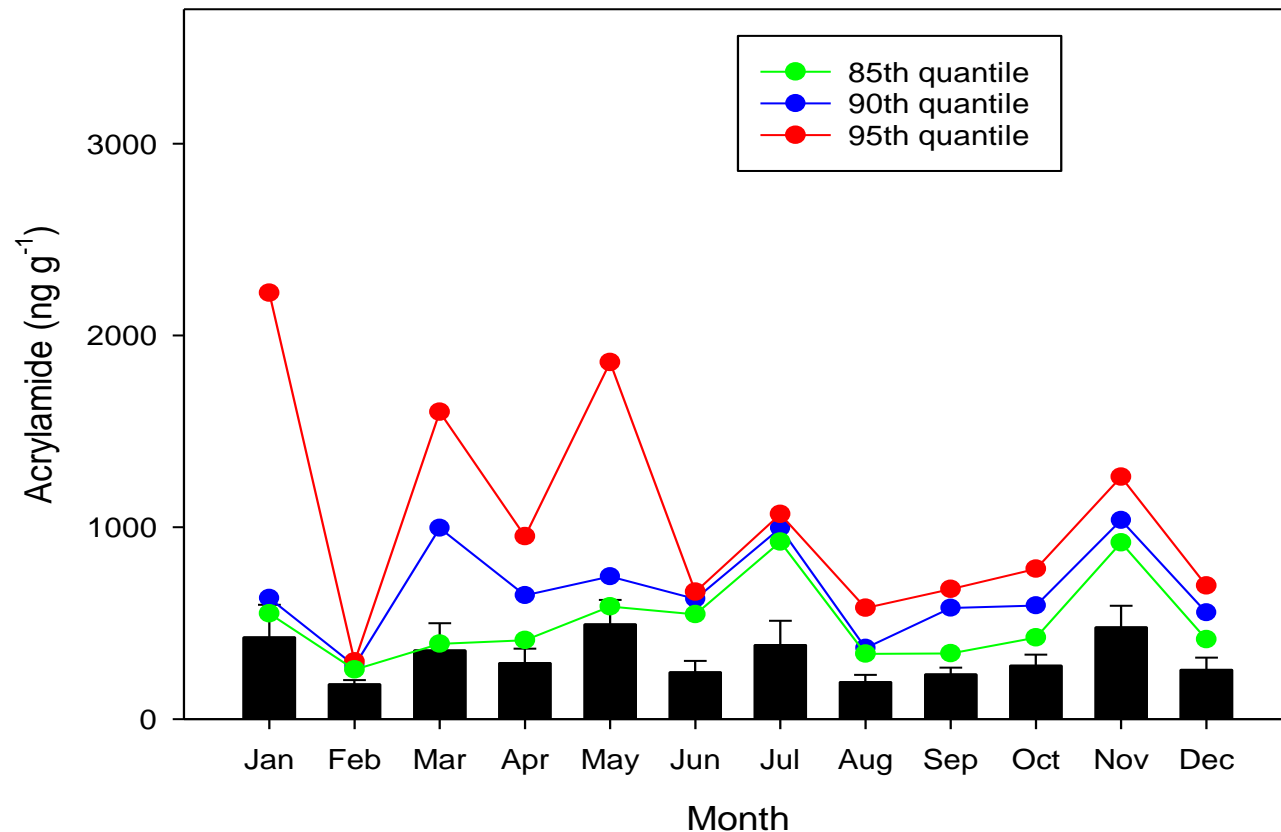
Potato Sticks: Means, SEs, Q85, Q90, Q95 values over months



- There were 2 504 observations for potato sticks over the period 2012-2022.
- Mean for 2022 was the lowest seen so far (473.7 ± 12.41) as were the Q85, Q90 and Q95 values.
- Q90 (776 ppb) and Q95 (872) values still above the BML.
- 11.86% of observations were greater than 750 ppb in 2022.

# Subset of data: Lattice cut 2012-2022

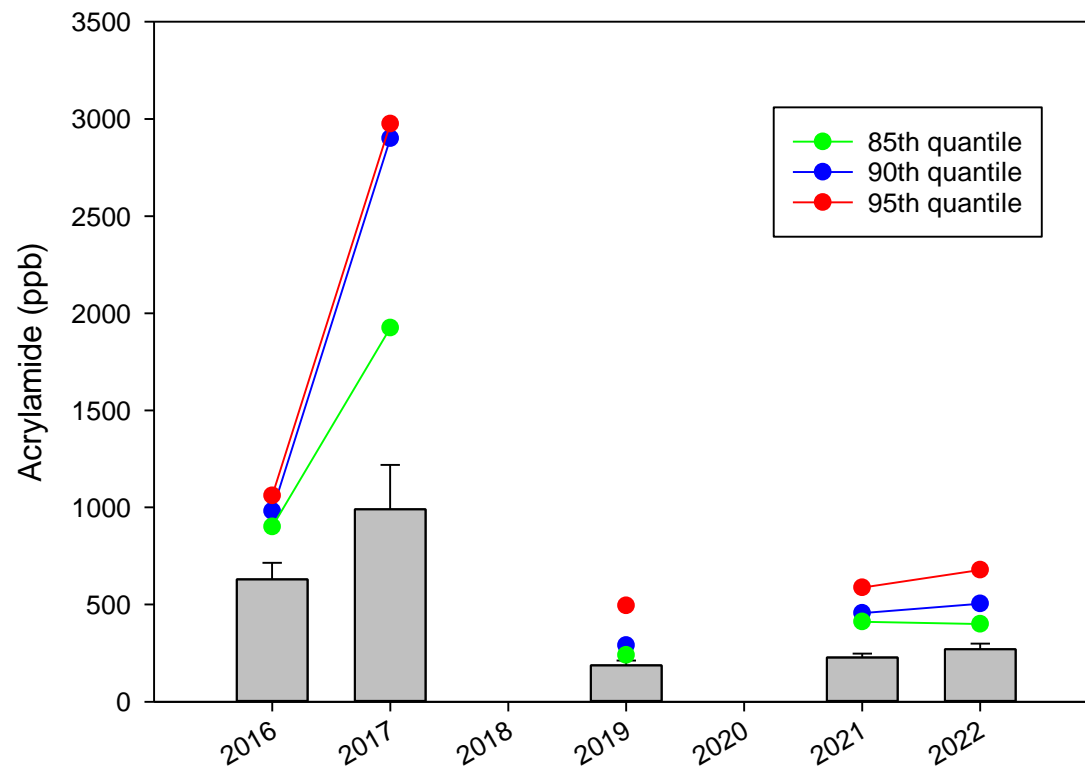
Lattice type: Means, SEs, Q85, Q90, Q95 values over months



- The mean for 2022 was  $270.6 \pm 28.34$  ppb with only one observation (910 ppb) out of 38 (2.63%) being above the Benchmark Level.
- No observations greater than 1000 ppb have been seen in 2019, 2021 and 2022 (there were no data for the Lattice type in 2020).

# Sliced potato crisps 2023 data

Lattice type: Means, SEs, 85th, 90th and 95th quantiles



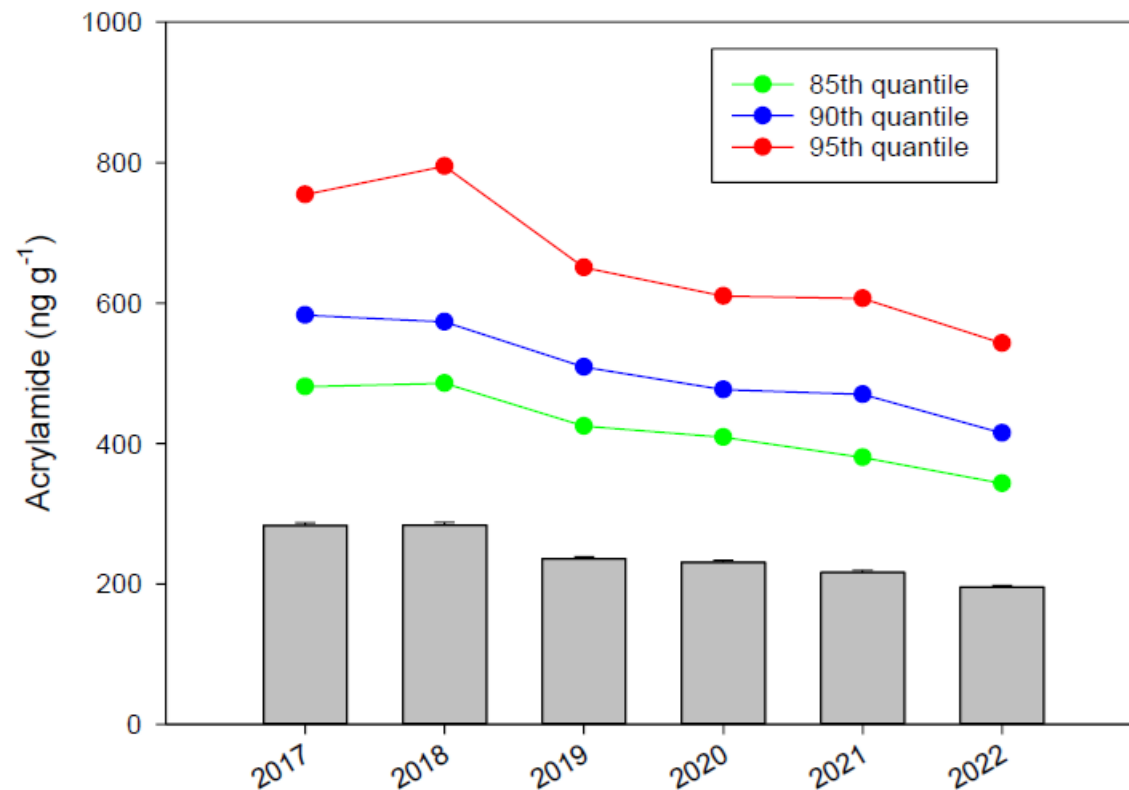
- There were insufficient monthly data to make any firm conclusions about seasonality for this type of crisp.

# Dough-based snack products 2017-2022

- ESA data set covers 22 countries.
- Total of 35778 observations.
- Huge variation in final products and production methods.
- 72 different 'main ingredients' were listed within the data, and for practical purposes these were grouped into 12 sub-categories.
  - Products with potato listed as the main ingredient gave the greatest percentages of samples above 1000 ppb AA (3.49% in 2018). By 2022 this had reduced to 0.94%.
  - Only products with potato as the main ingredient exhibited any samples above 2000 ppb. In 2022, this was 0.131% (5 out of 3830) potato samples.
  - Products with maize listed as the main ingredient had around 1% of samples above 1000 ppb AA in 2017. By 2021 this had fallen to around 0.1% of samples, and in 2022 there were no samples above 1000 ppb.
  - Products with wheat also had around 1% of samples above 1000 ppb AA in 2017. By 2022, this had fallen to 0.68% of samples tested.
  - No other main ingredient gave a sample with greater than 1000 ppb AA in 2022.

# Dough-based snack products 2017-2022

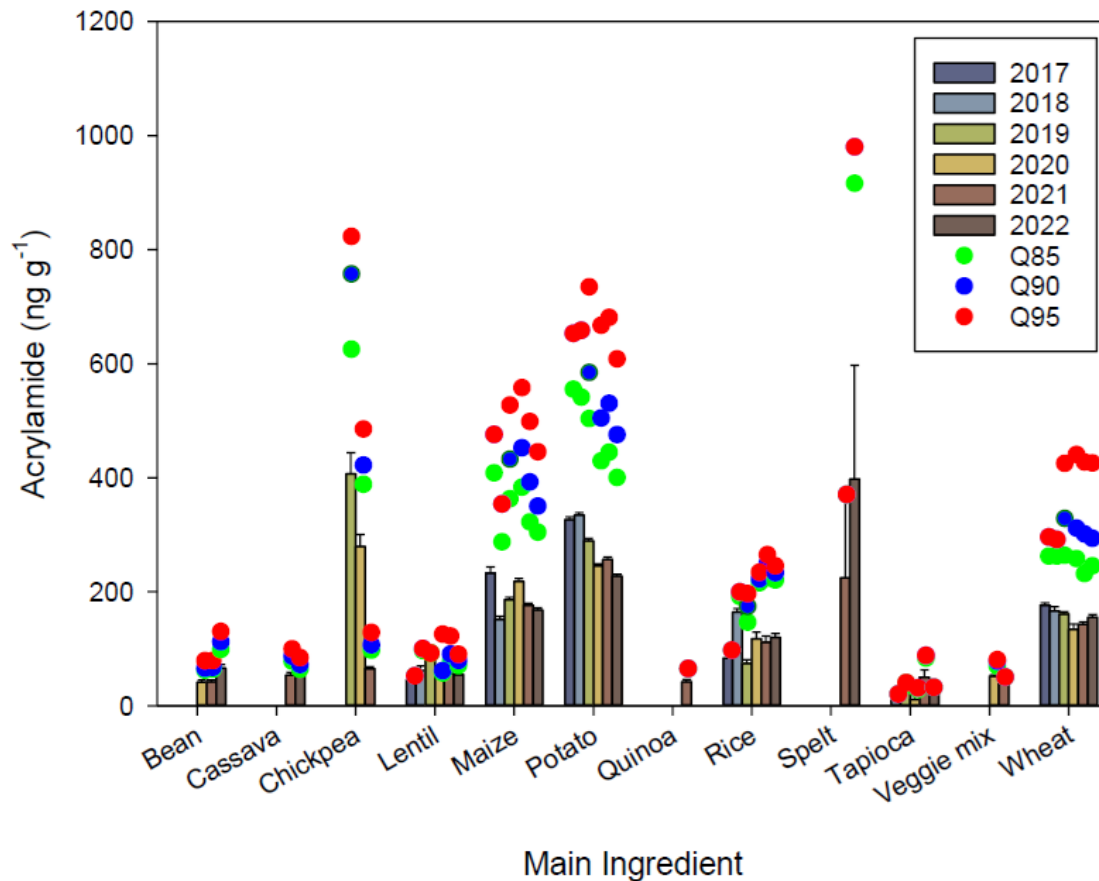
Means, SEs, 85th, 90th and 95th quantiles



- ❑ Q95 fell below the benchmark level of 750 ppb in 2019 and has remained below this level since then.
- ❑ In 2022, the mean ( $195.5 \pm 2.33$  ppb), Q85 (343.0 ppb), Q90 (415.0 ppb) and Q95 (542.8 ppb) were the lowest seen so far.
- ❑ However, a maximum of 2500 ppb was seen in 2022, so large values are still observed.
- ❑ The reduction in mean AA from 2021 ( $216.3 \pm 2.913$  ppb) to 2022 ( $195.5 \pm 2.33$  ppb) was statistically significant ( $p < 0.05$ , LSD).

# Dough-based snack products 2017-2022

Means, SEs, Q85, Q90 and Q95



- ❑ Potato main ingredient gave the highest AA values in 2017-2018 with the Q95 being above the BML level of 750 ppb in both years.
- ❑ Chickpea main ingredient gave the highest AA values in 2019-2020, with both Q90 and Q95 above 750ppb in 2019.
- ❑ Spelt gave the highest mean AA value in 2022 and was relatively high in 2021.
- ❑ Although the Q95s for maize and wheat were below the 750 BML level in 2021 and 2022, the maximums reported were still above the BML in these years.
- ❑ AA in all the other main ingredients was relatively low.

# Root and taproot vegetable crisps

## ❑ Future BMLs for vegetable and fruit crisps?

### New Benchmark Levels

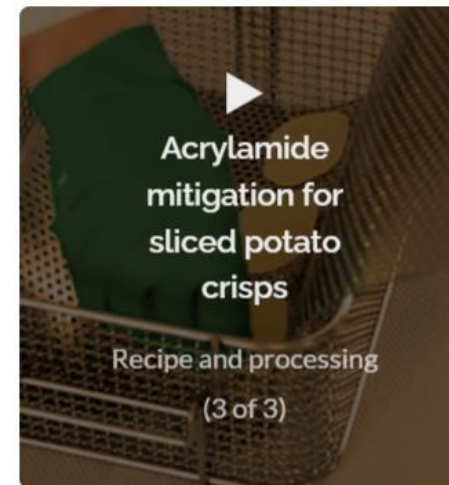
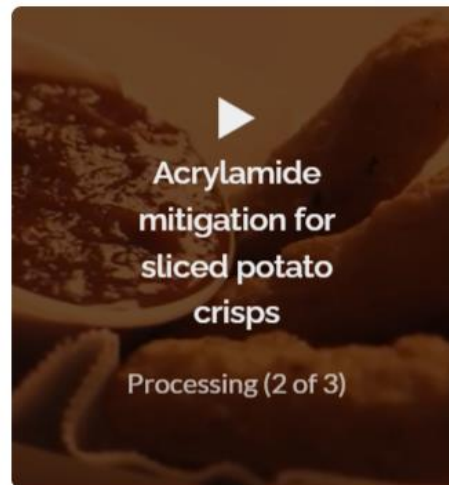
Food	Benchmark level	Corresponding mitigation measures Reg 2017/2158
Fruit crisps/chips	250 µg/kg	Mitigation measures Annex I, I + Ia
Vegetable crisps other than potato and cereal crisps	700 µg/kg	Mitigation measures Annex I, I + Ia

- ❑ However very small market: Fruit and Vegetable crisps typically make up < 1% of the total savoury snacks market by volume (Nielsen, Nov 2021).
- ❑ Consumption data for potato crisps should not be used for exposure calculation for these products.
- ❑ Fruit crisps/chips were not specifically included under Commission Recommendation (EU) 2019/1888 or by the FoodDrinkEurope toolbox.
- ❑ Definition of what is in scope needs to be clarified; e.g. which fruits and vegetables? What types of processing steps apply?
- ❑ Many mitigation measures identified in Regulation (EU) 2017/2158 for potato crisps and similar products will not be transferable for other vegetables or fruits.
- ❑ ESA working on possible mitigation tools for inclusion in updated Toolbox.

# How can I get more information?

## ▪ Join ESA!

- Participate in the annual data collection activity.
- Receive summaries of all the data collected.
- Help shape the guidance.
- Help inform the regulations.
- Read the latest peer reviewed paper: Progress on reducing acrylamide levels in potato crisps in Europe, 2002 to 2019 <https://www.tandfonline.com/doi/full/10.1080/19440049.2020.1871083>
- Check out the ESA website: [www.esasnacks.eu](http://www.esasnacks.eu)





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Association

# THANK YOU

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