WELCOME

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Chemisches und
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FOOD SAFETY

ANIMAL HEALTH

CONSUMER PROTECTION

Baden-Württemberg

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Examples of a German official control laboratory on avoidable mineral oil contamination in food

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18.01.2024 Working Group on Industrial and Environmental Contaminants in food

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- **1 of 5 official control laboratories of Baden-Württemberg, Germany**

  → CVUA Stuttgart has established mineral oil analysis since 2017
  → About 100 - 200 samples of food and food packaging analysed / year

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Introduction

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Matrices we have analysed in the past few years:

For example:

- dry and non fatty food: rice, dry fruits, sweets, instant potatoe products, herbs
- fatty foods: chocolate, nuts, spices, infant formula and follow-on formula, fish and fish products, sausage products, vegetarian and vegan substitute products
- oil and fat: olive oil, rapeseed oil, palm oil, coconut oil, oil for fish cans, butter, ghee

  → we can confirm: 90% samples are without MOAH

- paper and board
- plastic packaging
- lubricating oil

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Contamination with MOSH from packaging

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Example 1 – Butter

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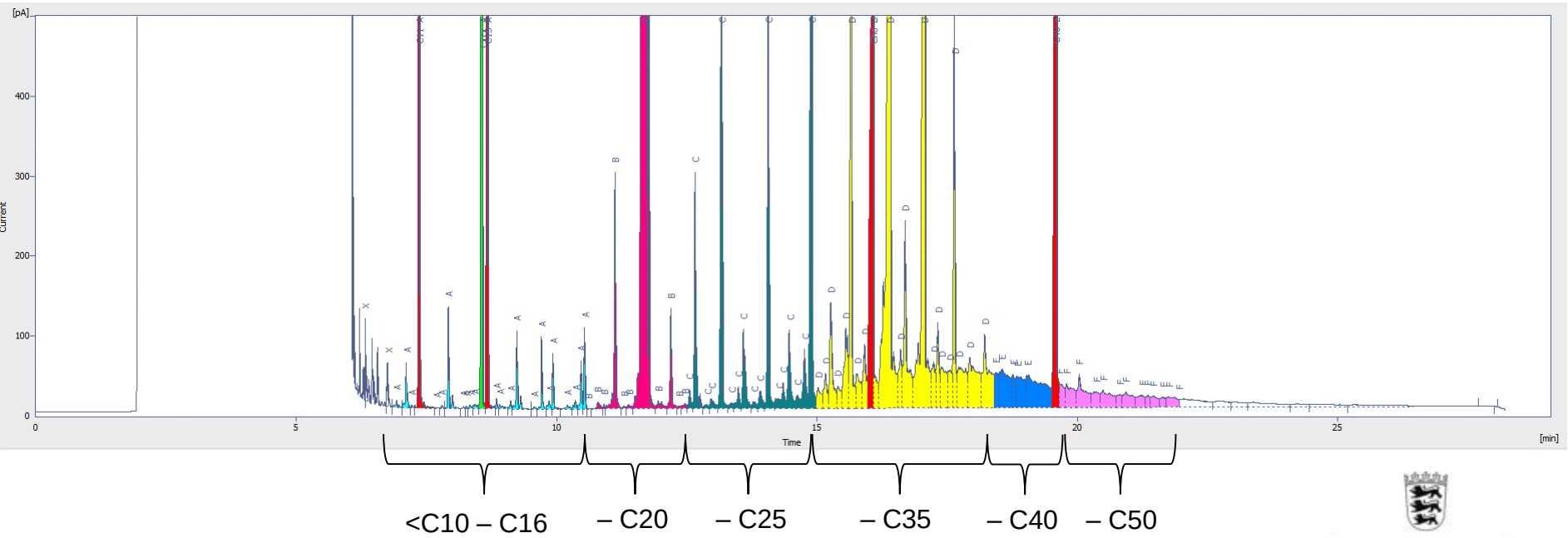
2023: campaign with 10 samples of butter

MOSH average: 13 mg/kg (max. 21 mg/kg total, not fat only)
MOAH 10 of 10: < LOQ (2 mg/kg)

Typical MOSH contamination in milk fat:



→ Butter is a concentrate made from milk fat

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Example 1 – Butter

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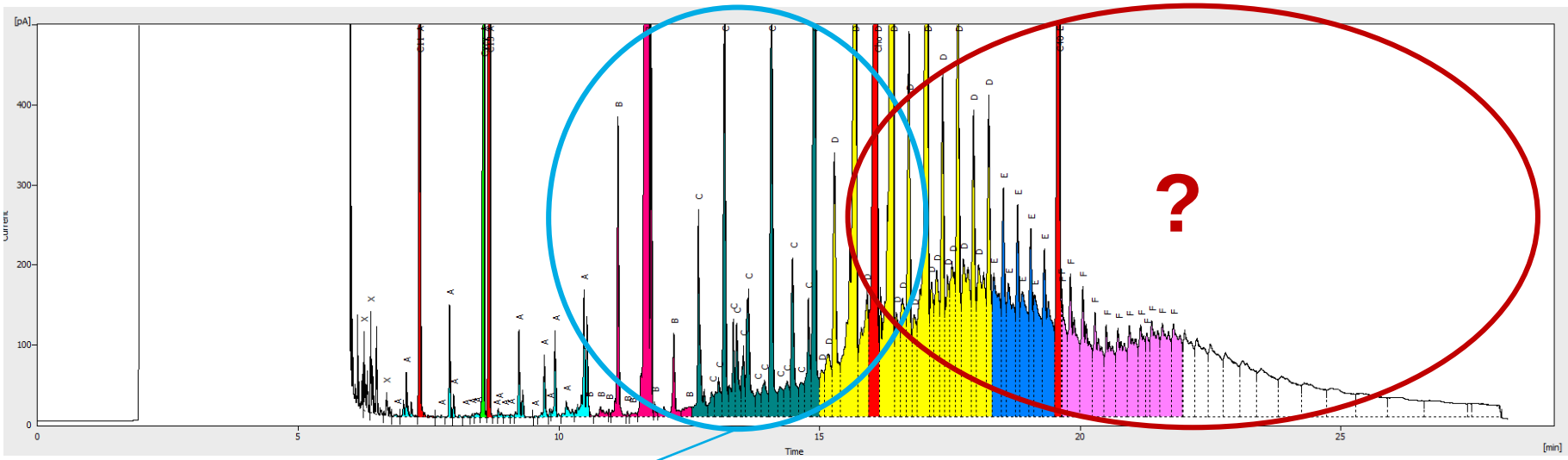
One butter sample with a second hump:

MOSH contamination after Epox-clean up:



typical contamination for milk products

GCxGC-Tof-MS characteristics of second hump: a lot of cycloalkanes, waxes

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Example 1 – Butter

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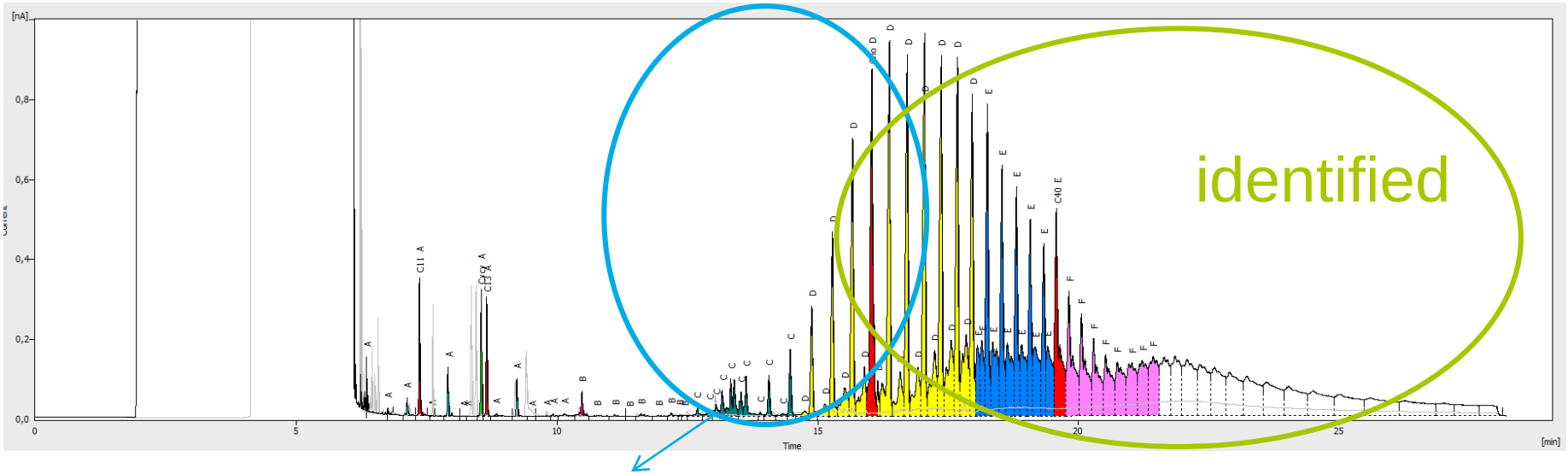
Packaging material:

MOSH and MOAH analysis of butter wrapping paper:



→ Avoidable, as we have not seen the contamination with other butter manufacturers

→ But maybe challenging to get the packaging manufacturers on board.

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Contamination with MOAH through the drying process of oil seeds

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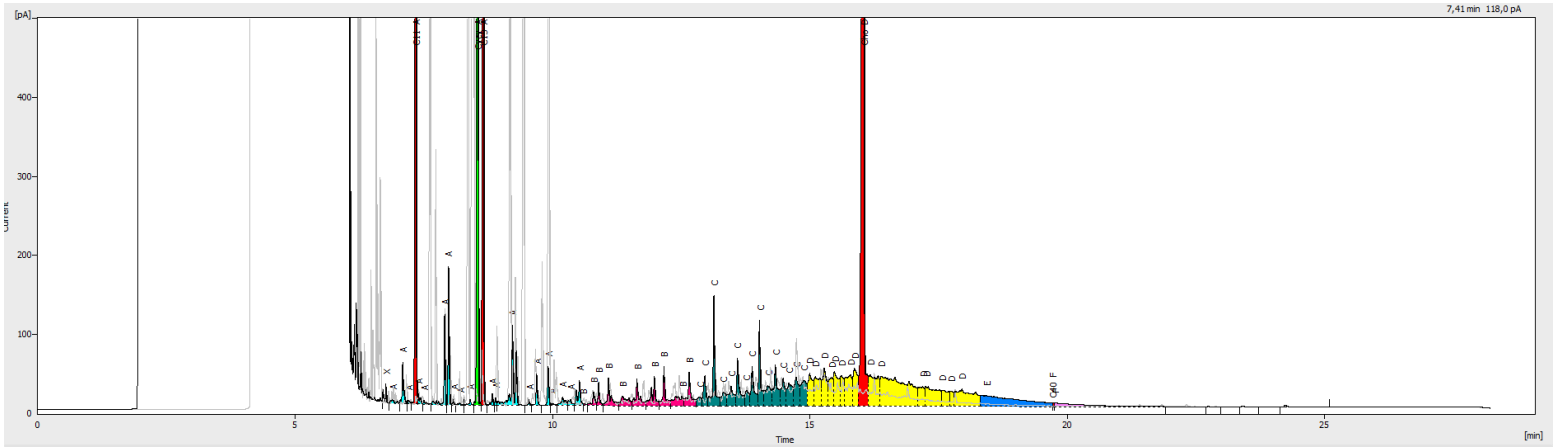
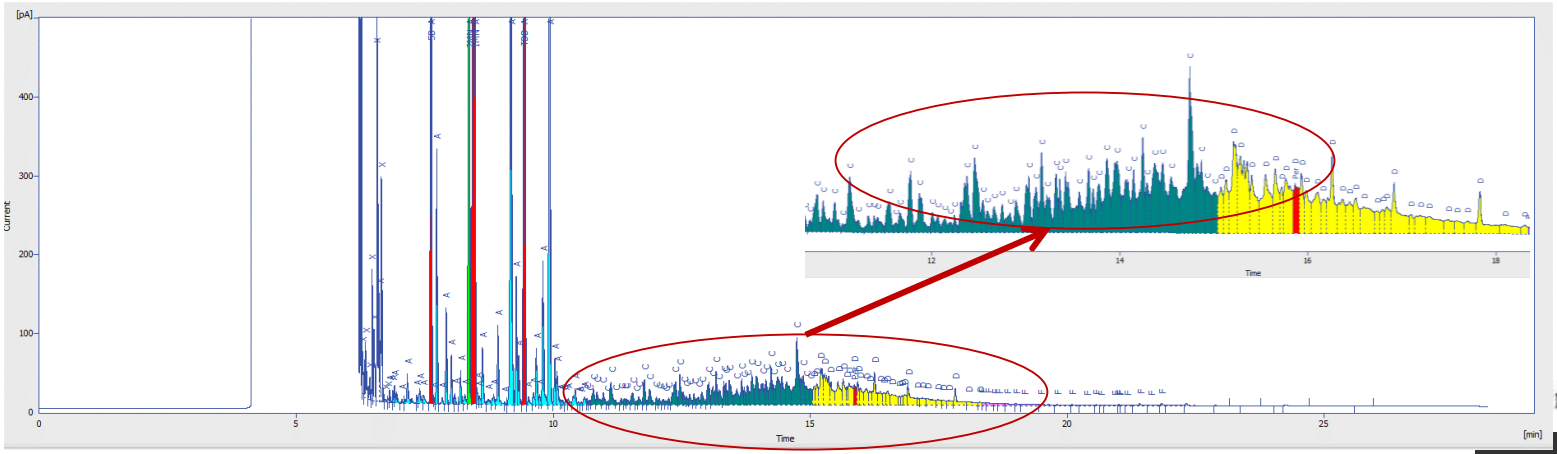
Example 2 – Hemp oil

2023: campaign with 17 samples of hemp seed oil

MOSH average: 8.6 mg/kg (max. 18 mg/kg)
MOAH 16 of 17 < LOQ (2 mg/kg); 1 of 17: 3.5 mg/kg



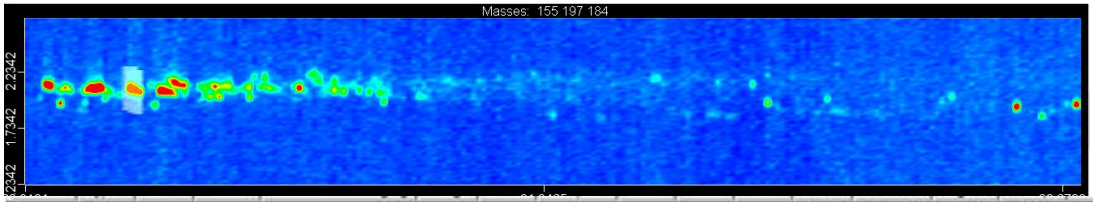
MOSH (Alox) = 8.5 mg/kg



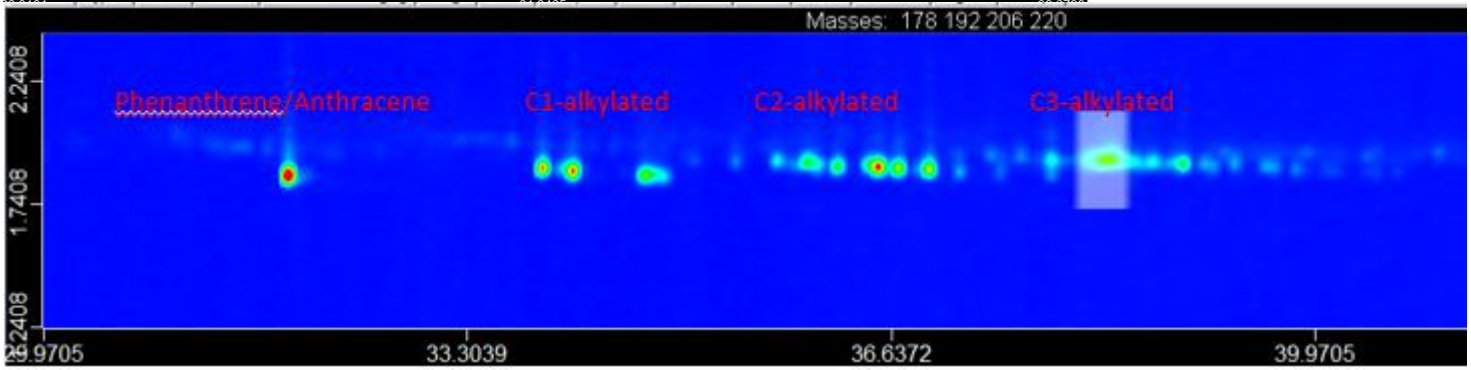
MOAH (Epox) = 3.5 mg/kg

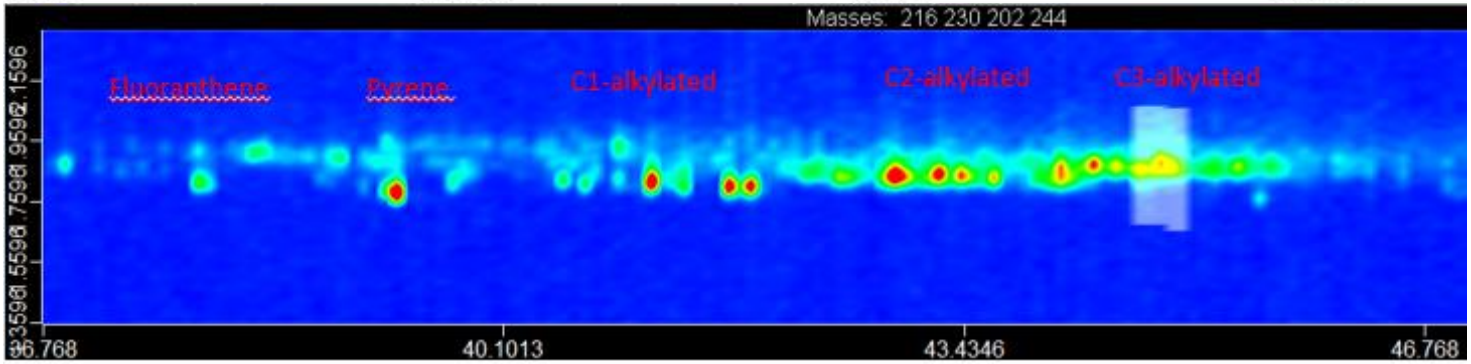
Example 2 – Hemp oil

Comprehensive GCxGC-Tof-MS-Analysis:

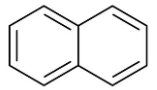


alkylated Naphthalenes

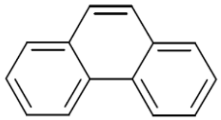




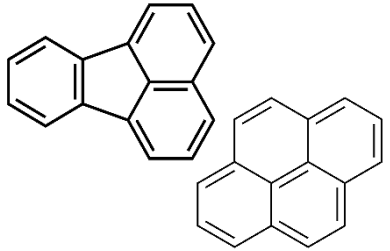
2-ring PAC



3-ring PAC



3.5 + 4-ring PAC



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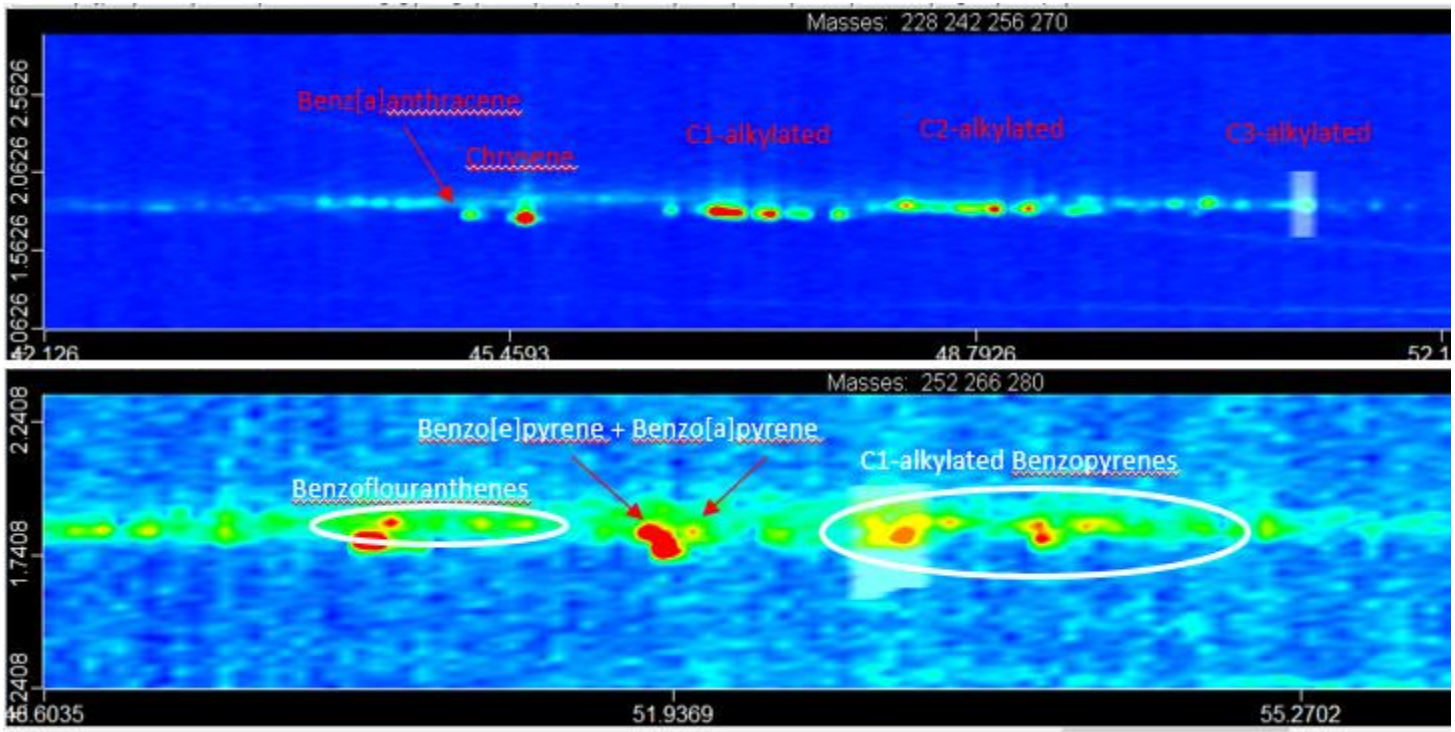
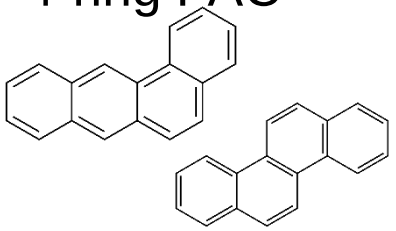
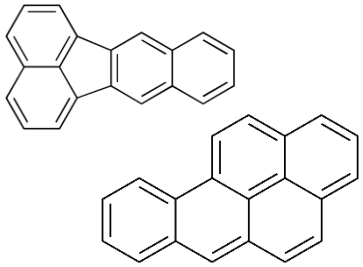
Example 2 – Hemp oil



4-ring PAC



4.5 & 5-ring PAC



Feedback from the food inspector after the inspection:

Cause of the contamination: a diesel-powered hot air generator for drying the oilseeds (which possibly also contained some exhaust fumes from the diesel engine) → avoidable contamination

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Contamination of fresh fruits - Is this possible?

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Example 3 – Fresh apple

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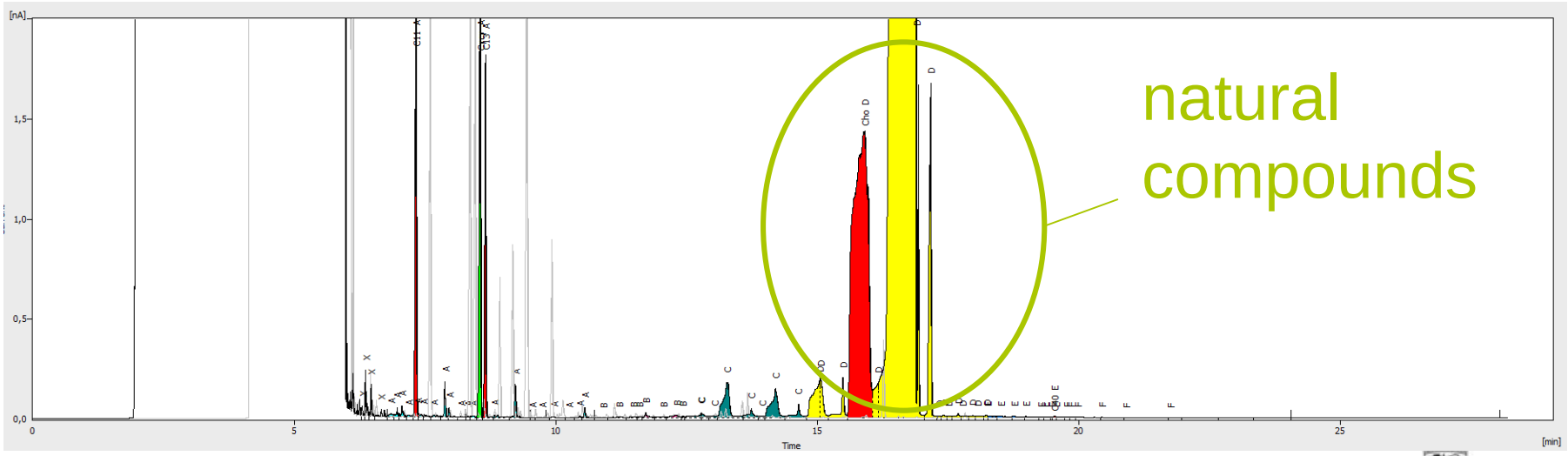
Results of a small research project:

Observations on local farmers markets:
Is it safe to wrap fruit and vegetables in newspaper at the weekly farmers market or to store fruit on it (wooden boxes lined with newspaper)?

Apple peel + pulp without any storage or contact with newspaper:



→ MOSH + MOAH < LOQ

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Example 3 – Fresh apple

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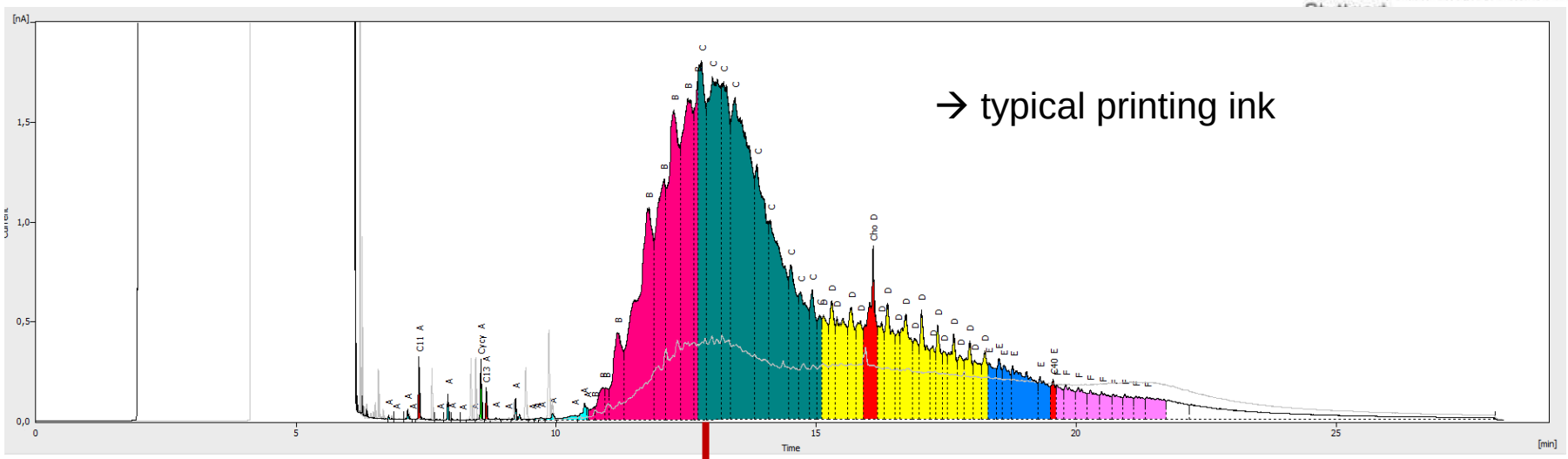
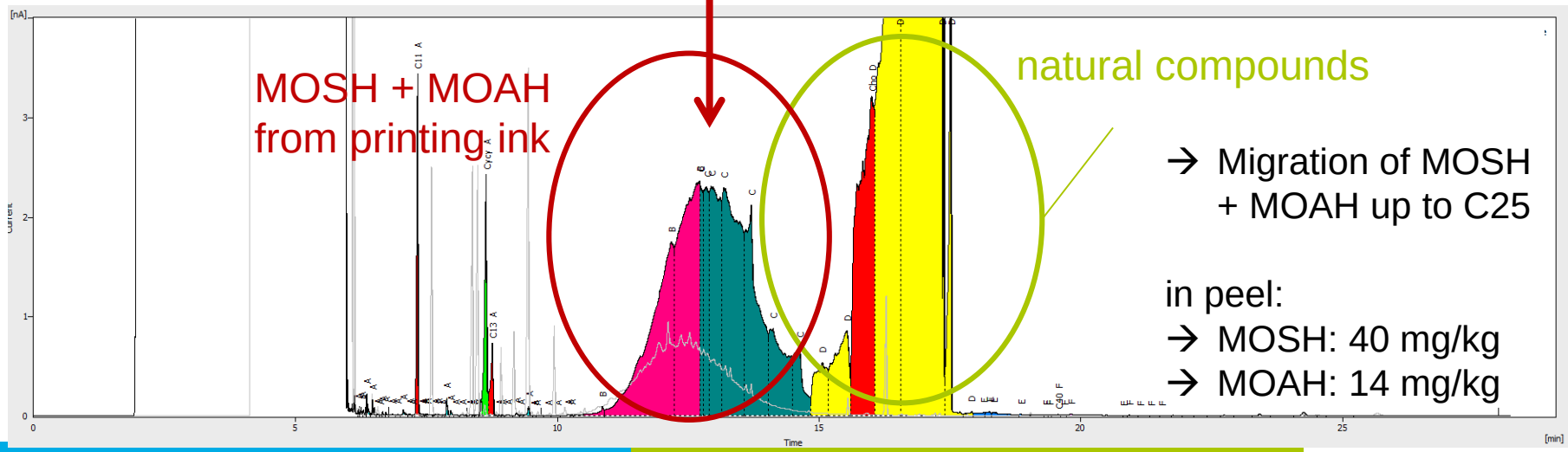
MOSH and MOAH chromatogram newspaper:



Peel of the apple after storage 2 weeks on it, room temperature:



Example 3 – Fresh apple

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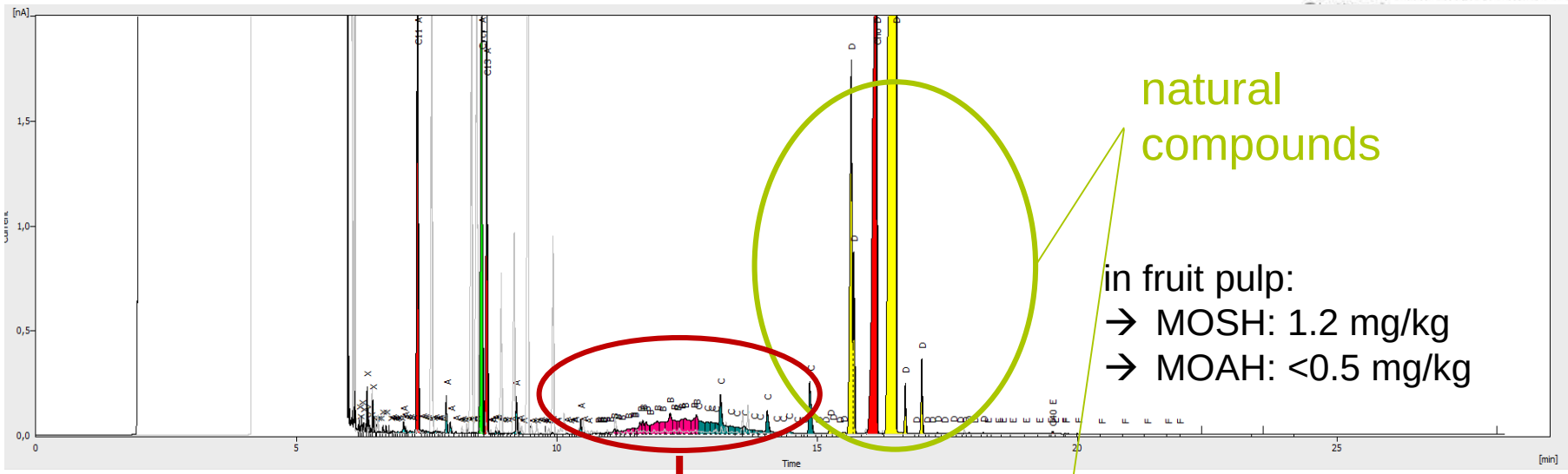
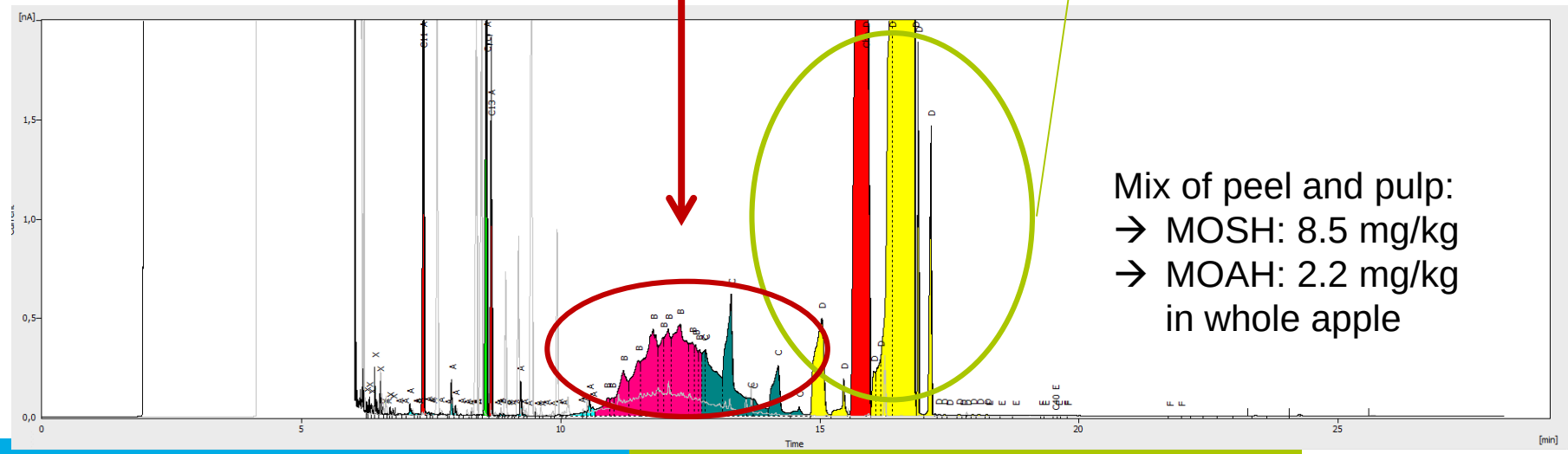
MOSH and MOAH chromatogram only fruit pulp after storage:



natural compounds

in fruit pulp:
→ MOSH: 1.2 mg/kg
→ MOAH: <0.5 mg/kg

Peel and fruit pulp homogenized of one apple after storage:



Mix of peel and pulp:
→ MOSH: 8.5 mg/kg
→ MOAH: 2.2 mg/kg
in whole apple

Example 3 – Fresh apple

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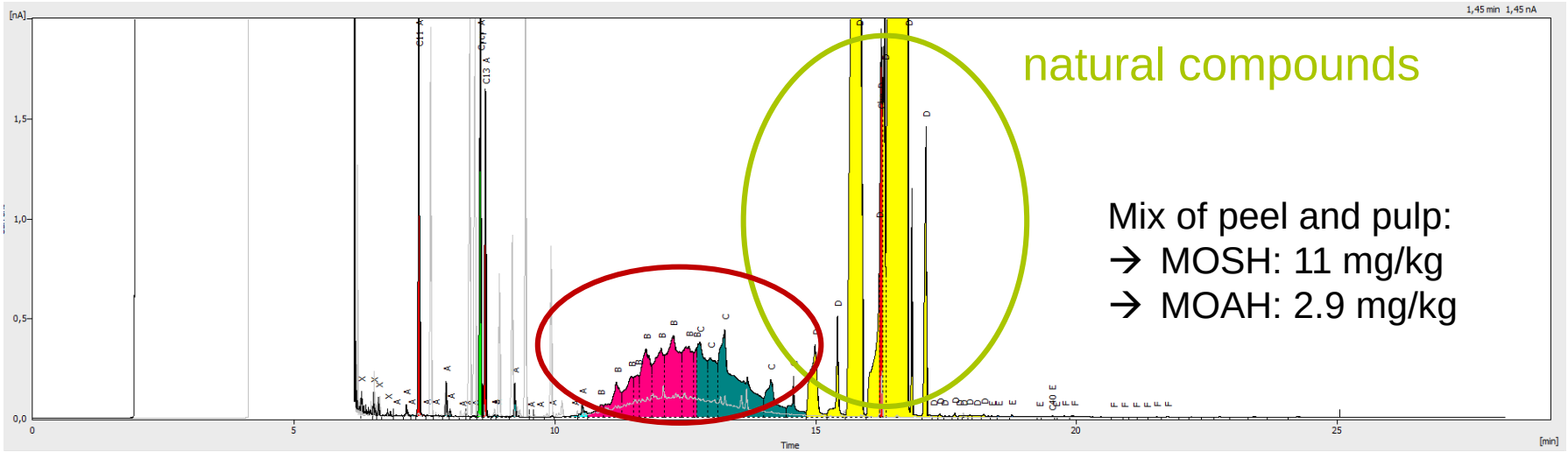
MOSH and MOAH chromatogram of apple after washing and wiping dry with a towl:



→ Washing will not help to minimize the contamination, only peeling!

MOH = contamination during process

→ even if it is not foreseeable use: accidents or incorrect use are always possible and should also be taken into account for fresh fruits and vegetables

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Conclusion

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→ contamination from many different sources possible

→ official controls show: most contaminations are avoidable
  → often result of lack of knowledge

→ process contaminant: all food and all steps of production should be taken into account

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Thank you for your attention.

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