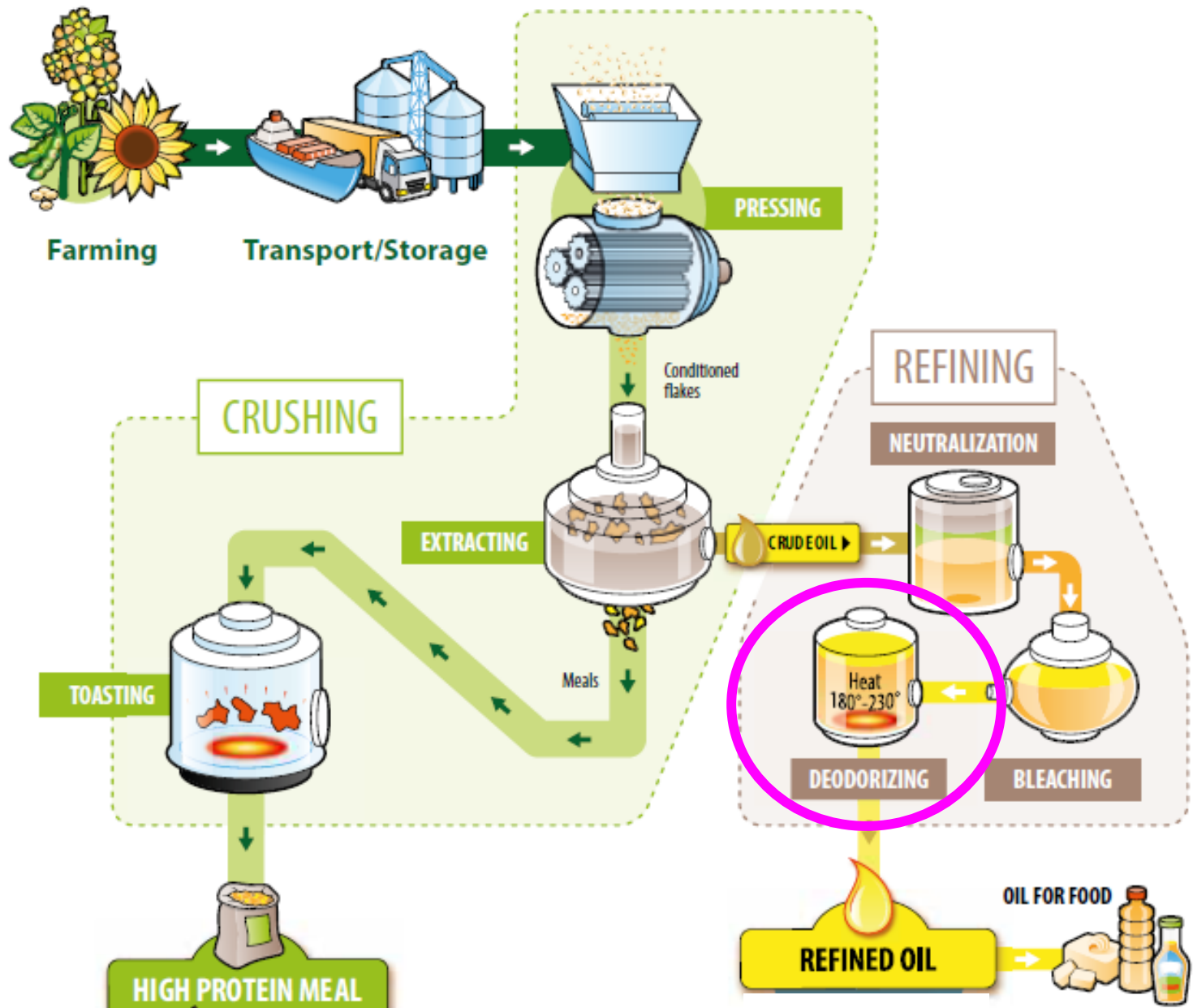


Glycidyl Esters in Edible Fats and Oils and Infant Formula

Centre for Food Safety
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Background

- There has been concern on the presence of glycidyl esters (GE) in foods in the recent years
- GE are processing contaminants
 - Primarily found in refined fats & oils, and foods containing fats & oils (e.g. infant formula)
 - Previous studies showed that palm oil generally contains higher level of GE
 - Formed during the deodorization step of oil refining



Background (2)

- After ingestion, GE is broken down in the human body to release glycidol, which is considered to be harmful to health.
- Glycidol was reported to have neurotoxicity, renal toxicity, carcinogenicity, anti-fertility effects, and genotoxicity in animal studies.
- IARC classified glycidol as probably carcinogenic to humans (Group 2A).

CFS's Risk Assessment Study

- CFS has conducted a risk assessment study on GE
- The study aims to:
 - Examine the levels of GE in fats and oils, as well as infant formula available in the local market

Sampling

- **Sample size:**
207
- **Sampling time:**
Dec 2018 -Feb 2019

Type	No. of samples
Edible fats and oils	169
Animal fats, margarine and spreads	63
Vegetable oils and fats *	106
Infant formula	38
Total	207

* Including palm oil, canola oil, corn oil, peanut oil, soybean oil, sunflower oil, mixed vegetable oils, and other vegetable oils

Result (Edible Fats and Oils)

- All the 169 edible fats and oils samples analysed had GE detected at quantified levels

Types	No. of samples collected	GE level ($\mu\text{g}/\text{kg}$) (expressed as glycidol)		
		Mean	Minimum	Maximum
Animal fats, margarine and spreads	63	123	16	980
Vegetable oils and fats	106	833	16	4500
All edible fats and oils	169	569	16	4500

Result (Edible Fats and Oils)

- The GE levels ranged from 16 to 4 500 $\mu\text{g}/\text{kg}$, with a mean level of 569 $\mu\text{g}/\text{kg}$
- Palm oil was found to contain the highest mean GE level (4050 $\mu\text{g}/\text{kg}$)
 - Consistent with the observations and findings in overseas studies

Results- Infant Formula

Type	No. of samples	GE level ($\mu\text{g}/\text{kg}$)		
		Mean	Range	
Infant Formula	38	10.6	3.1	53

- The GE level detected ranged from 3.1 $\mu\text{g}/\text{kg}$ to 53 $\mu\text{g}/\text{kg}$, with a mean level of 10.6 $\mu\text{g}/\text{kg}$

International Comparison (1)

- Comparison of **mean GE level** in edible fats and oils and infant formula in EFSA, NZFS/FSANZ and CFS studies:

	Mean GE level ($\mu\text{g}/\text{kg}$) (expressed as glycidol)		
	EFSA	NZFS/FSANZ	CFS
Edible fats and oils	1184	758	569
Infant formula	94	26	10.6

- Mean GE levels for both “edible fats and oils” and “infant formula” samples in this study were relatively lower

International Comparison (2)

- Comparison of **range of GE level** in edible fats and oils and infant formula in EFSA, NZFS/FSANZ and CFS studies:

	Range of GE level ($\mu\text{g}/\text{kg}$) (expressed as glycidol)		
	EFSA	NZFS/FSANZ	CFS
Edible fats and oils	172 ^a - 6070 ^b	126 ^c – 7110	16 - 4500
Infant formula	56 ^a - 220 ^b	1.7 ^c - 484	3.1 - 53

^a Maximum value of the range of limit of quantification (LOQ)

^b 95% percentile (middle bound)

^c Limit of detection (LOD)

- The maximum GE levels for both “edible fats and oils” and “infant formula” samples in this study were relatively lower

Follow-up Observation

- Reduction of GE in refined oils and food is possible when traders increase their awareness on the issue and adopt relevant mitigation measures
- A signal of decrement on the GE level in food was observed when some locally available follow-up oil samples were re-tested in 2020
 - showed a reduction of more than 40% in most samples as compared with the GE level of the same products collected in late 2018-early 2019.

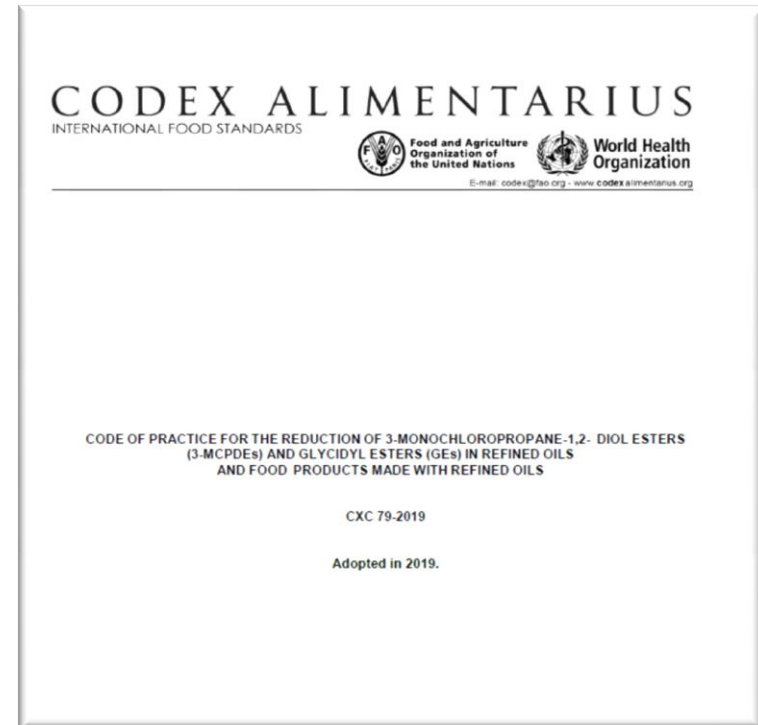
Limitation

- As GE are process contaminants which can be affected by various factors in the production, study results only represented a snapshot of the GE levels in foods
- As an usual practice, caution should be taken when comparing the results from different studies
 - Apart from the test methods adopted, other factors such as research methodology, sampling strategies, etc. would affect the outcome of the studies

Advice to Trade

- The food trade is recommended to take measures to minimize the levels of GE in their food products
 - by making reference to the relevant Code of Practice (COP) adopted by the Codex in 2019
 - in accordance to the principle of as low as reasonably achievable

Link to
the COP:



Advice to Public

- Members of public are advised to maintain a balanced and varied diet in order to avoid excessive exposure to any contaminant from a small range of food items
- In general, maintaining a healthy diet of lower fat content could reduce the overall intake of GE from our food
- Palm oil, which was known to contain high GE level, is also well-known for its high saturated fats content. Therefore, taking into consideration from both nutrition and contaminant perspective, limiting consumption of palm oil helps maintaining a healthy diet

Advice on Infant Feeding

- As breastfeeding is beneficial to the health of both mothers and their babies, mothers are encouraged to feed their babies with breastmilk.
- However, if infants are not breastfed, they should continue to be fed with industrially produced infant formula to ensure optimum nutrition.
- The German Federal Institute for Risk Assessment (BfR) considered that the probability that the current exposure levels of formula-fed infants will result in health impairments is low. However, further research on the subject is required to provide comprehensive information for risk assessment.

~End~

