

olenex

Specialists in Edible Oils



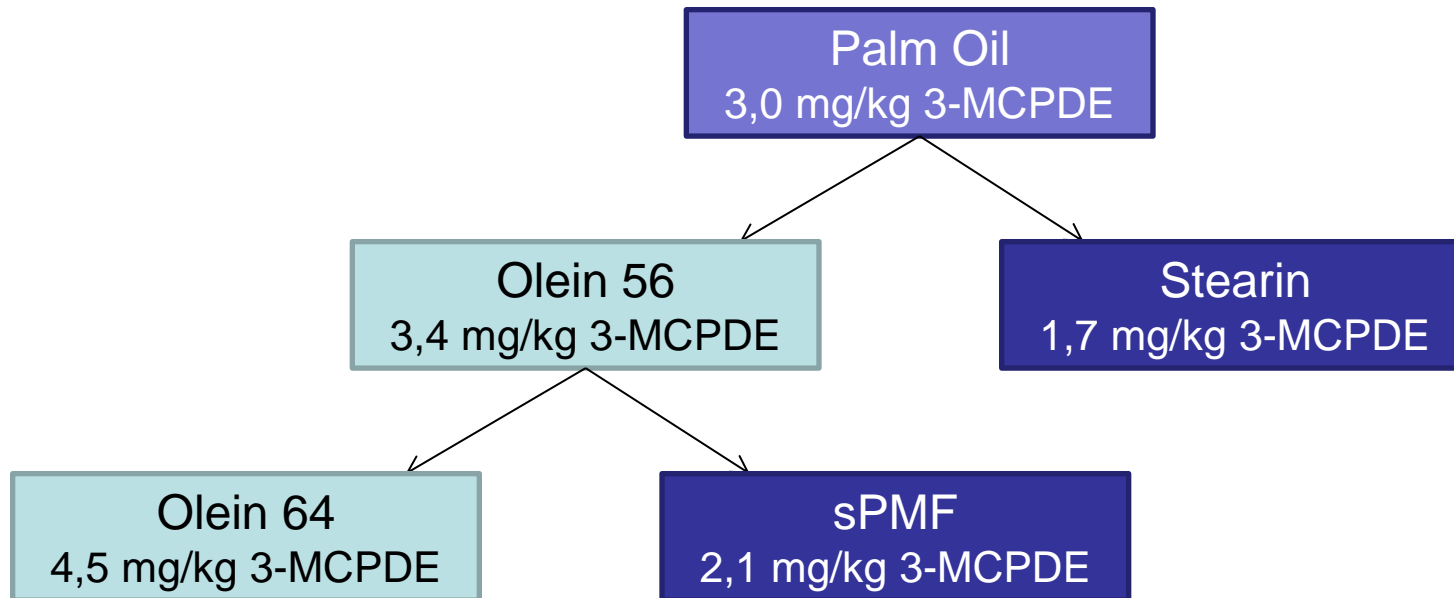
Mitigation of 3-MCPD- and Glycidyl- esters in Food Matrices

Where do 3-MCPD- and GE originate?

- 3-MCPD and GE mainly occur in refined vegetable fats during the high temperature processing
- Palm Oil tends to have the highest levels of 3-MCPD and GE
- Reducing fat content to lower 3-MCPD/GE-levels will significantly influence the taste and structure of the food
- Reformulation of the applied fat/oil blend could mitigate the problem

PALM OIL AND ITS FRACTIONS

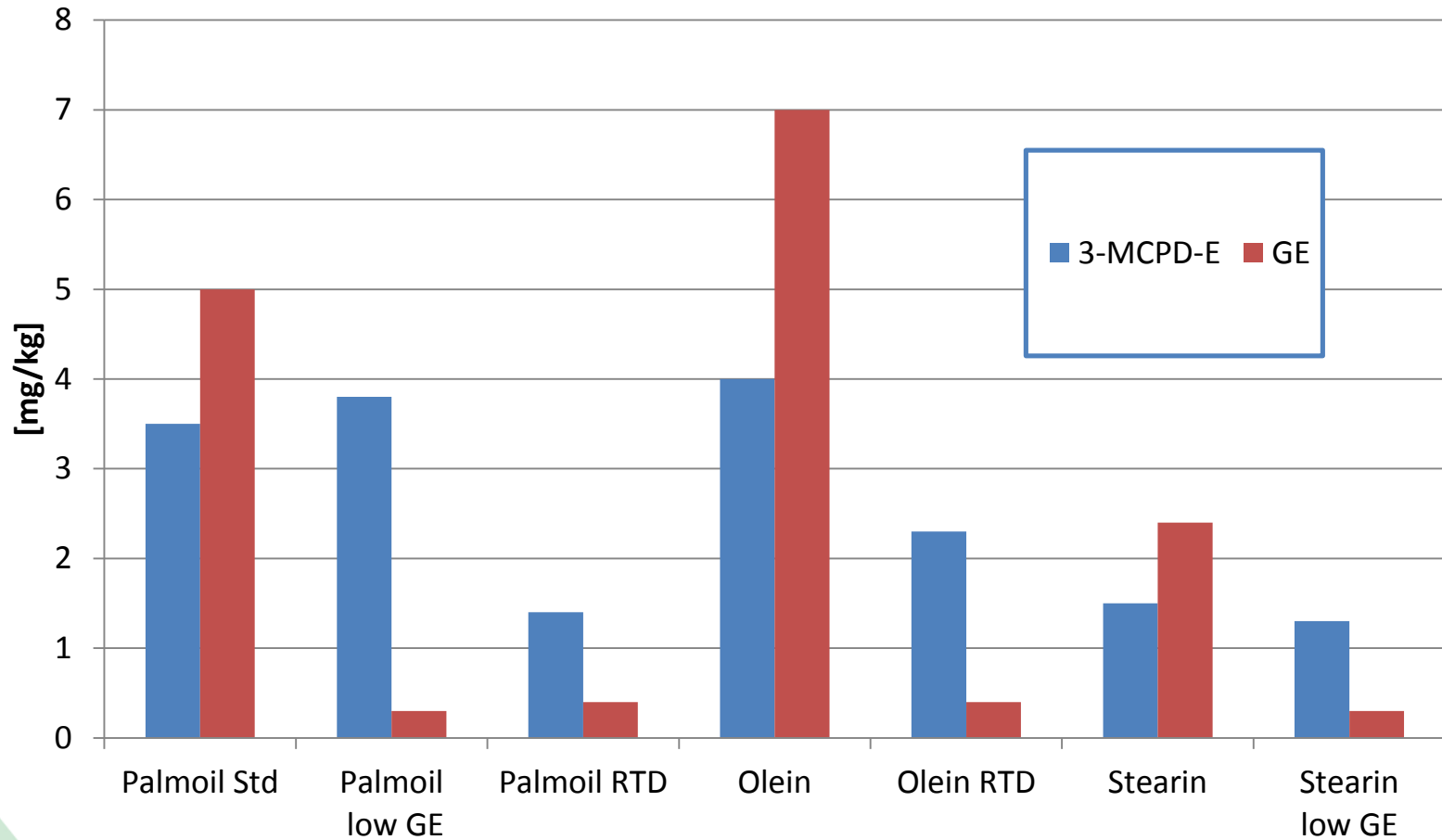
3-MCPD in Palm Oil and Fractions



Source: ADM Research

- In fractionation 3-MCPD and GE tend to go into the softer fractions. Soft fractions therefore include higher levels of these compounds.

Average 3-MCPD- and GE-values in Palmoil and -fractions



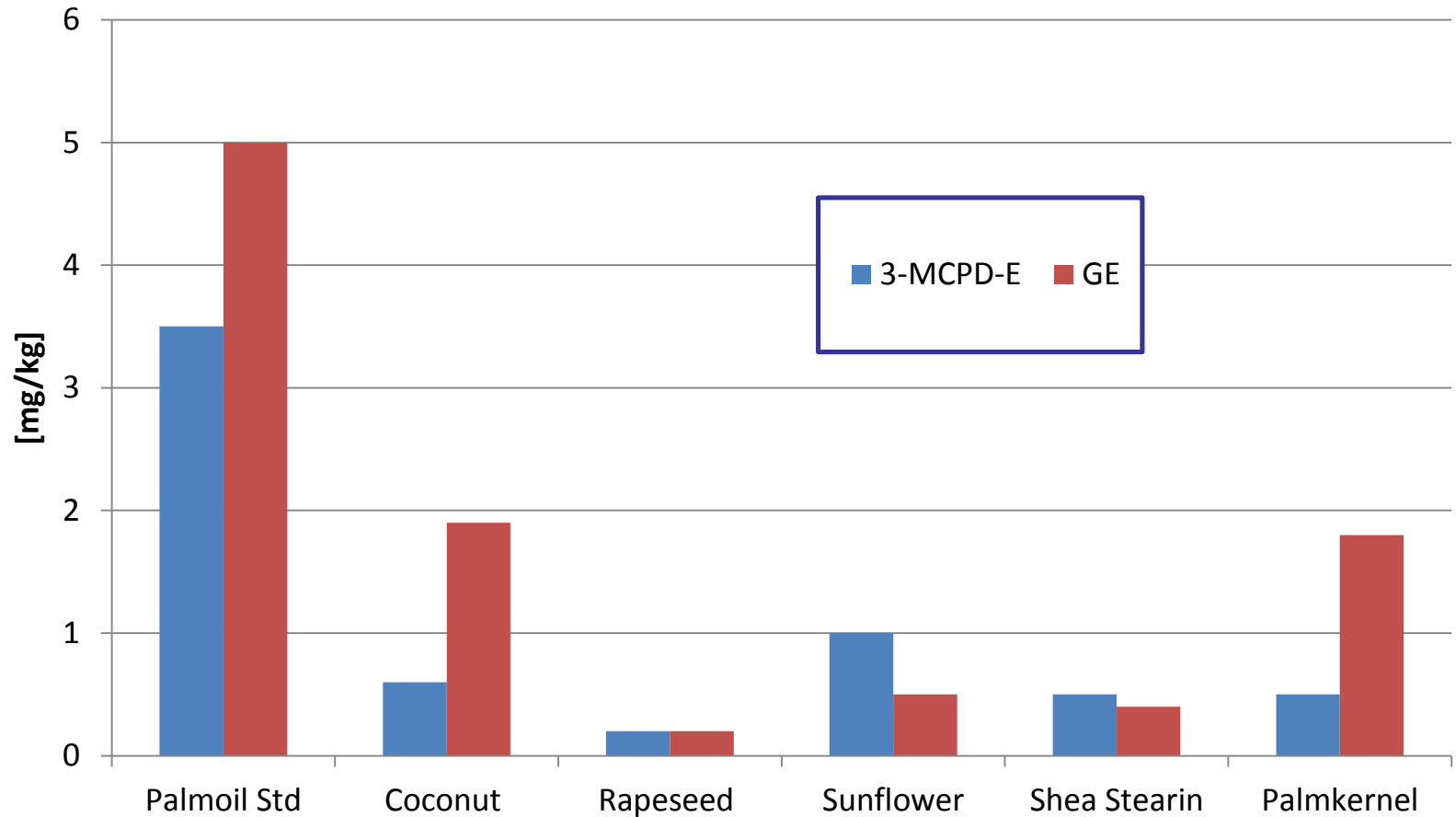
Source: ADM Research

3-MCPD- and GE reduction in Palm oil

3-MCPD and GE-reduction in Palm oil and its fractions is possible, but:

- To achieve significantly lowered 3-MCPD- and GE levels requires additional processing steps
- 3-MCPD can be significantly lowered, but it is very difficult to reach zero.
- GE can be minimised after refining
- The removal of 3-MCPD is very difficult. Therefore the formation of 3-MCPD has to be prevented in the sourcing and refining process already

Average 3-MCPD- and GE values in various oil types



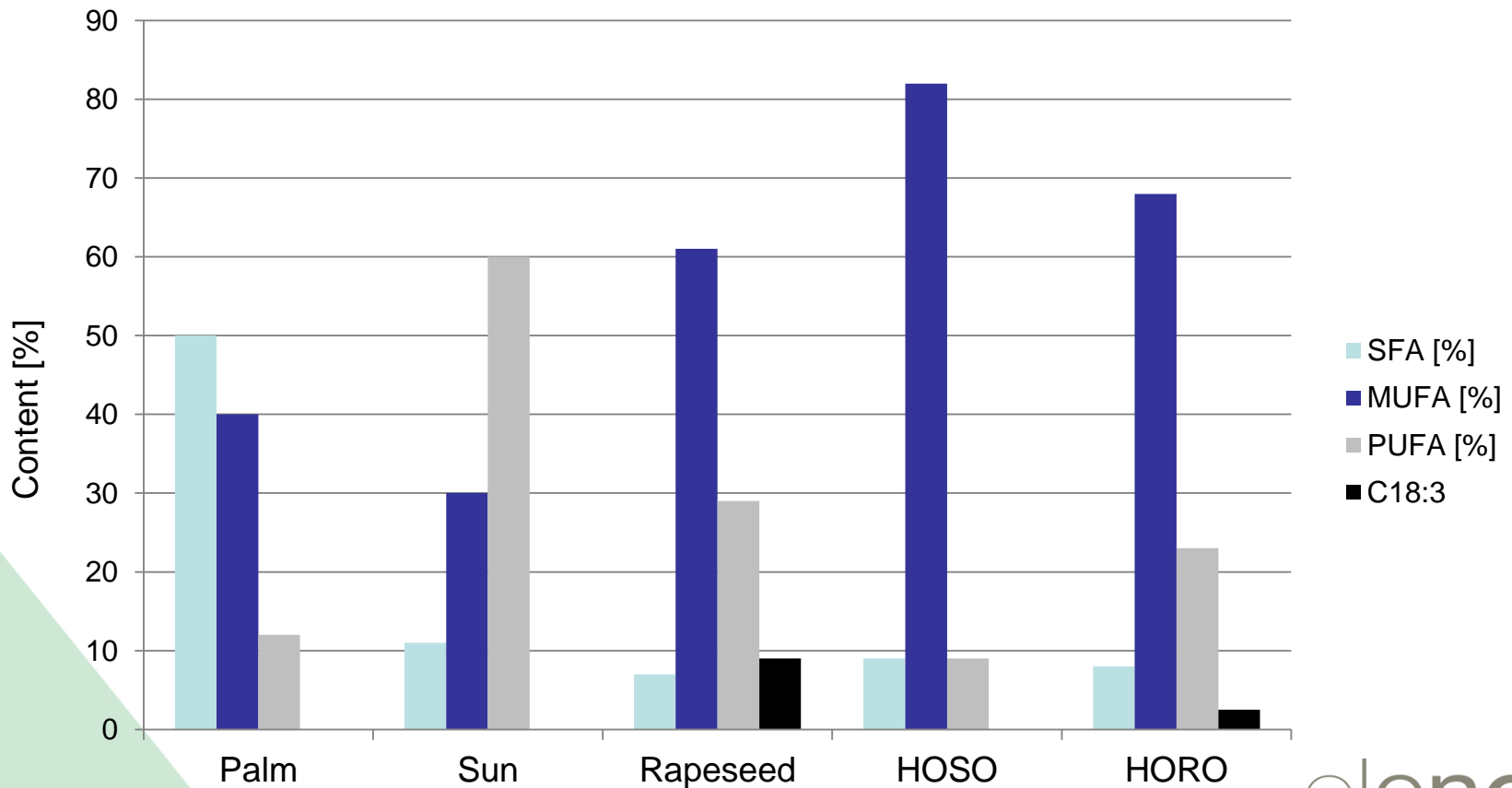
Source: ADM Research

REPLACING PALM OIL BY LIQUID OILS

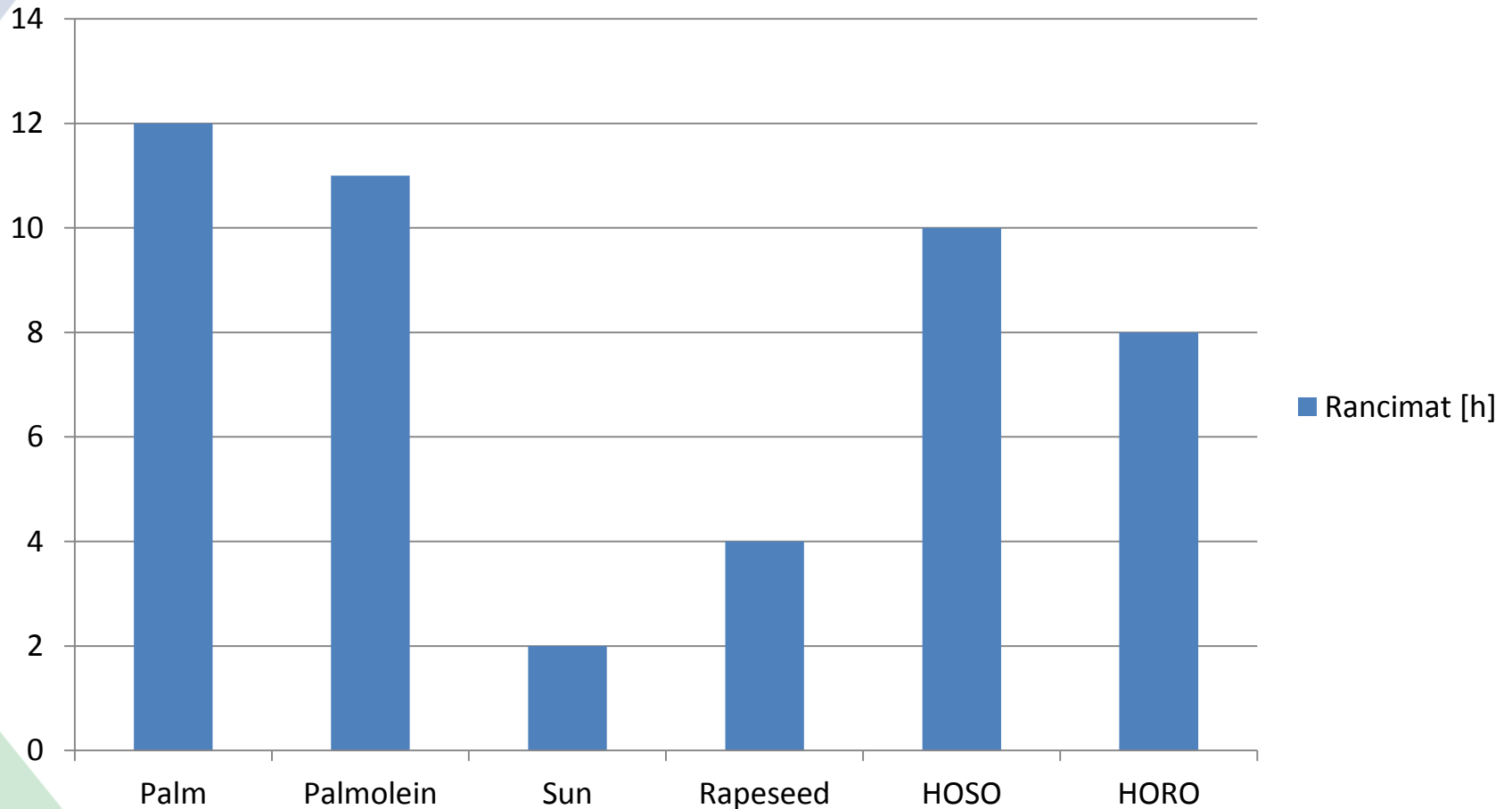
Simple Replacements for Palm Oil

In frying applications Palm oil and Olein can be replaced by liquid oils

Due to stability reasons the choice of the correct liquid oil is important

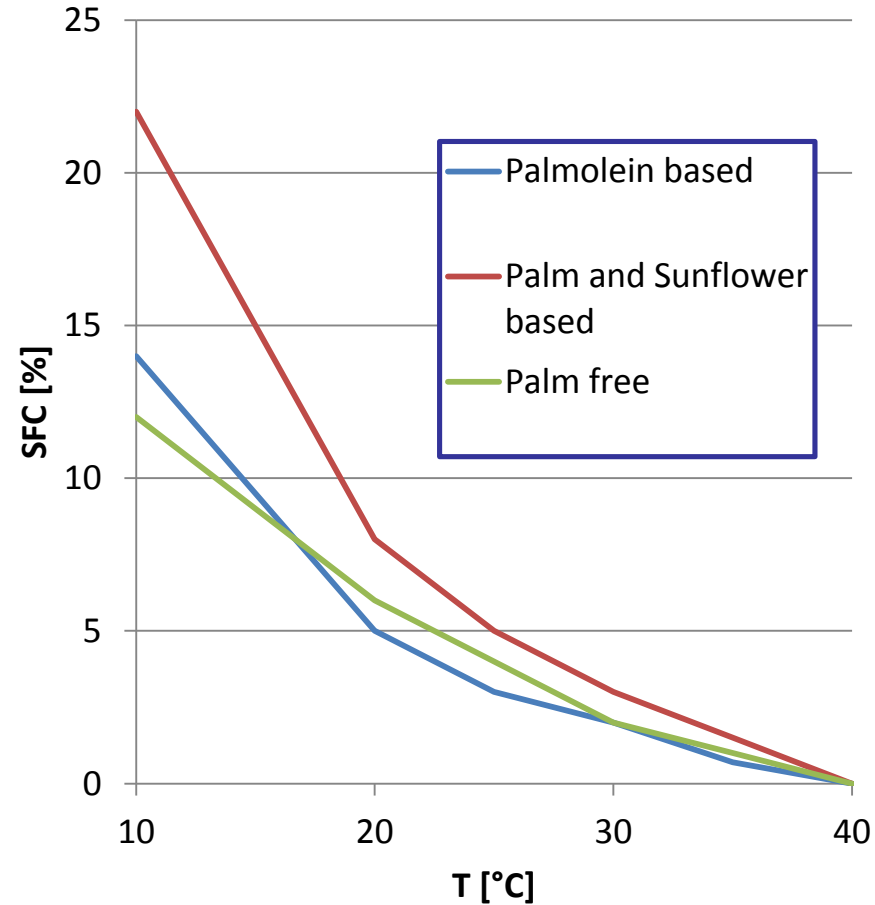
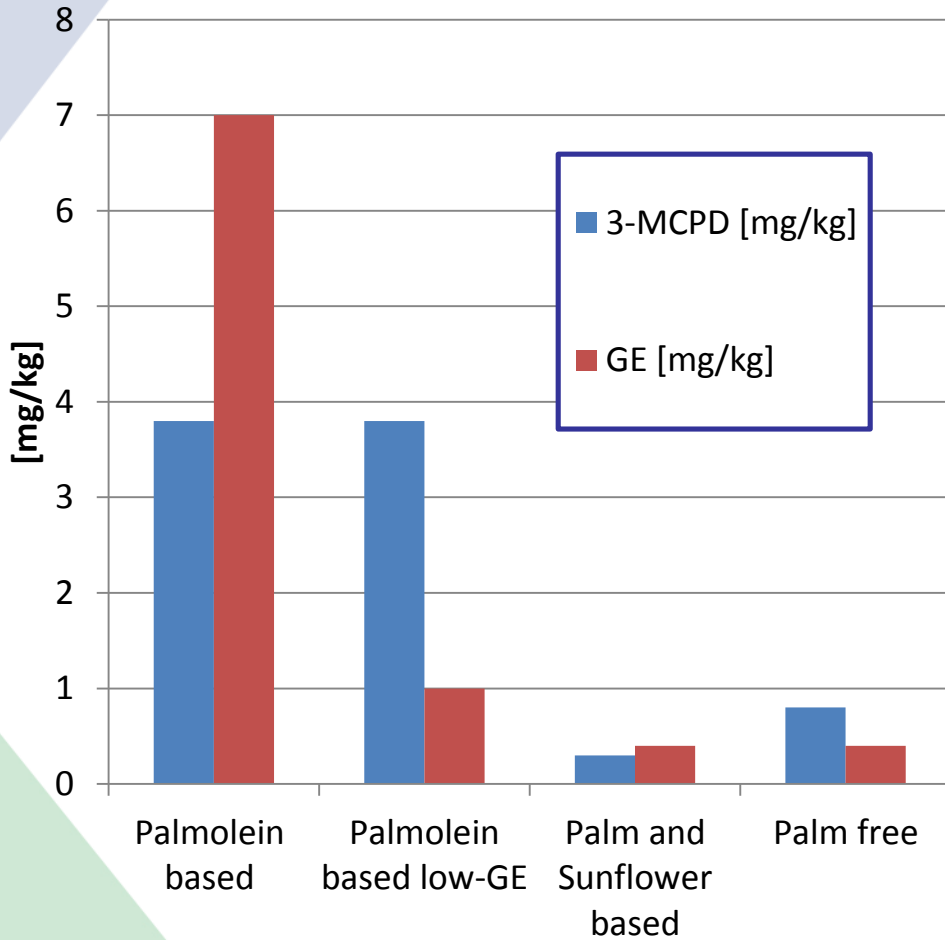


Rancimat stability of liquid oils and palm oil



Source: ADM Research

Example: Soft Filling Fat

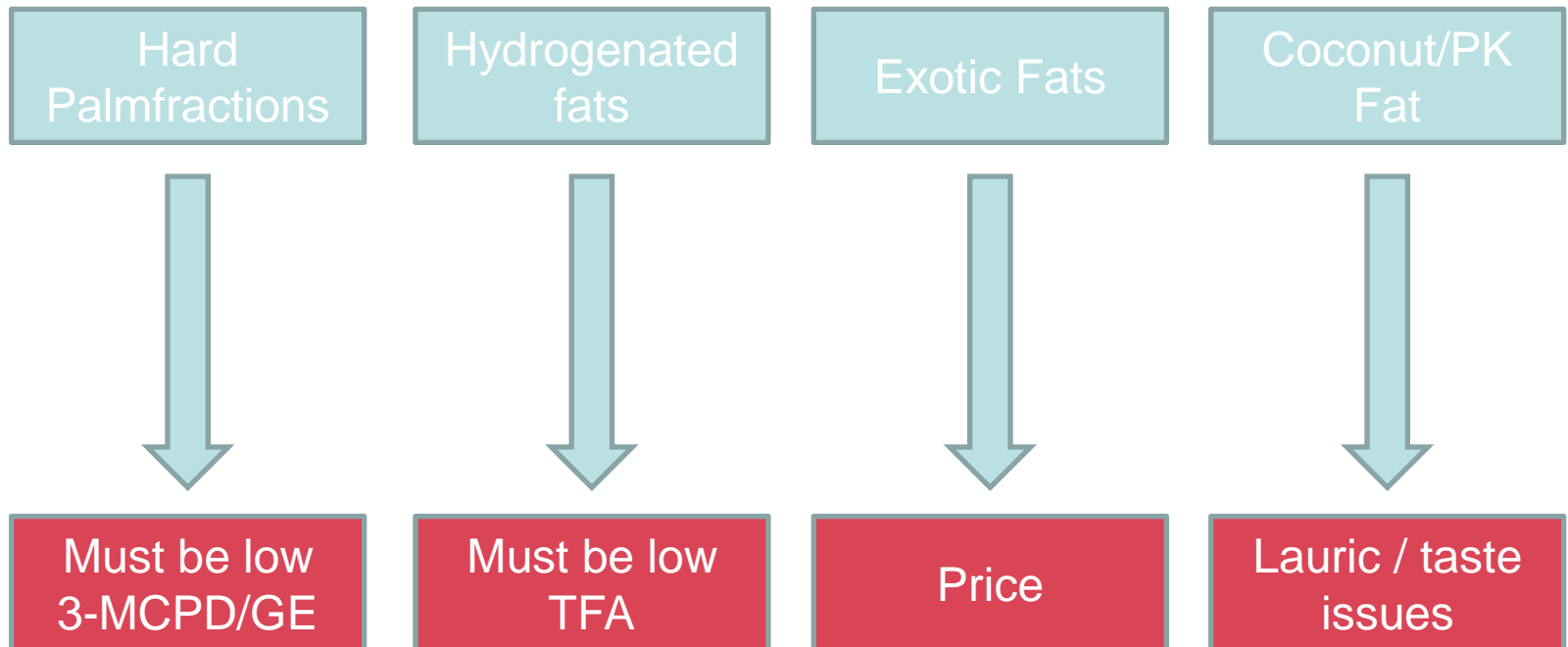


Source: ADM Research

Replacement of Palm in Harder Fats

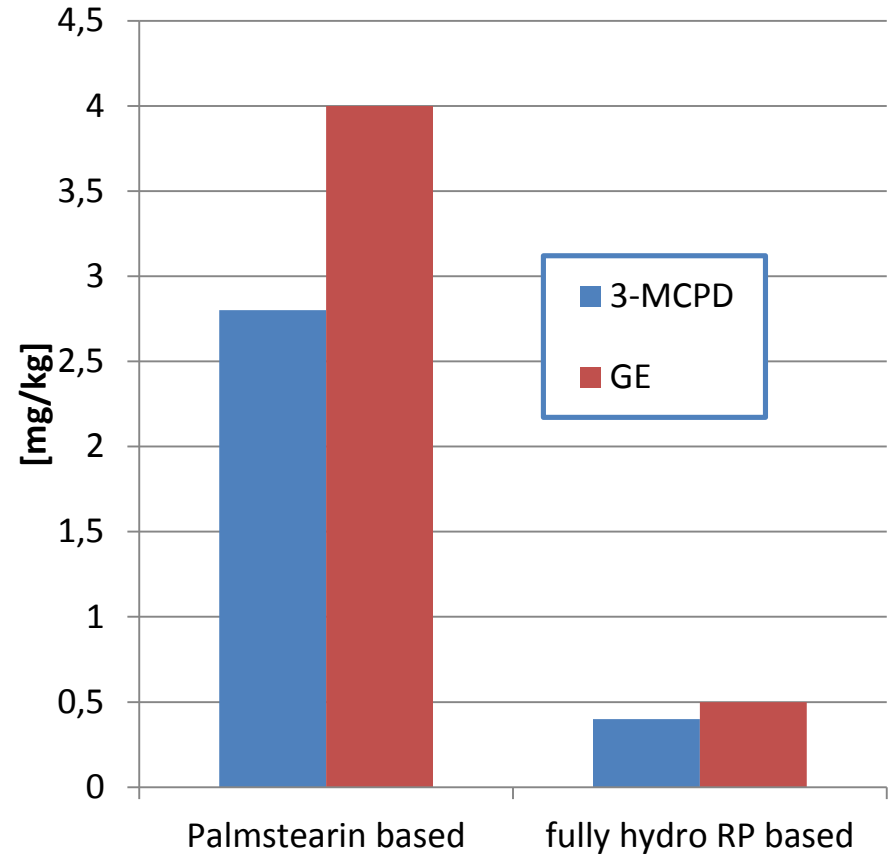
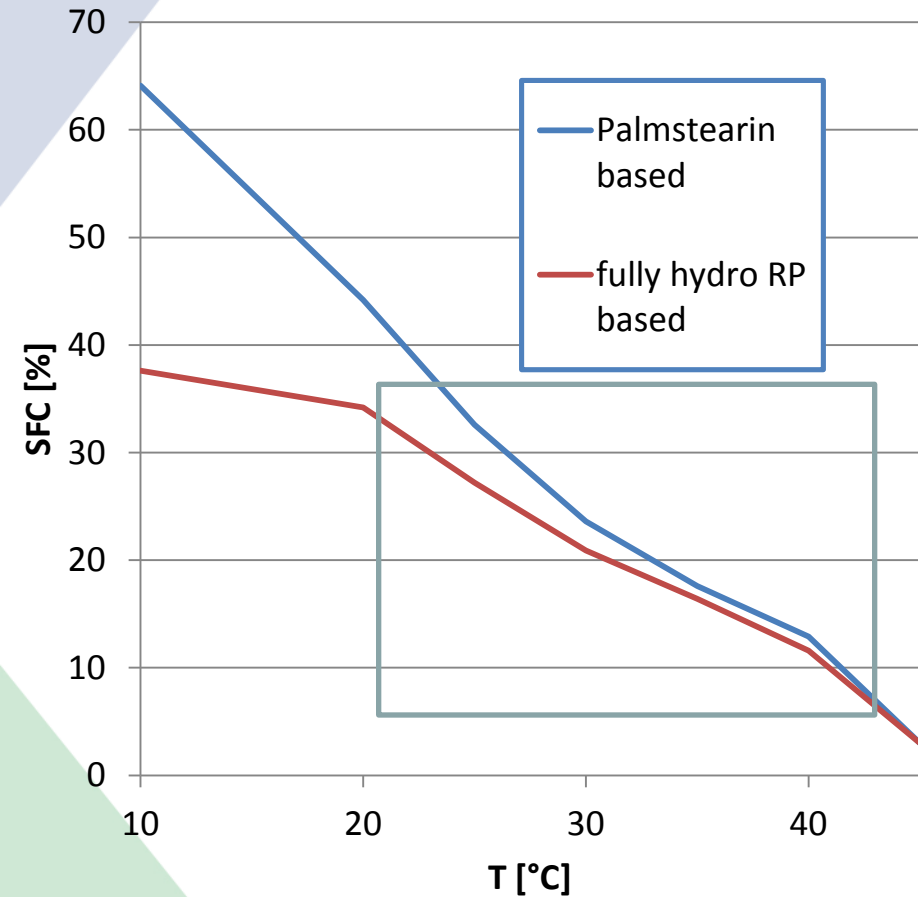
- ▶ In soft fats palm fractions can be replaced relatively easy by liquid oils
- ▶ If structure or higher solid fat contents are needed, the possible addition of liquid oils is limited

Potential Problems of low-3-MCPD Modifications



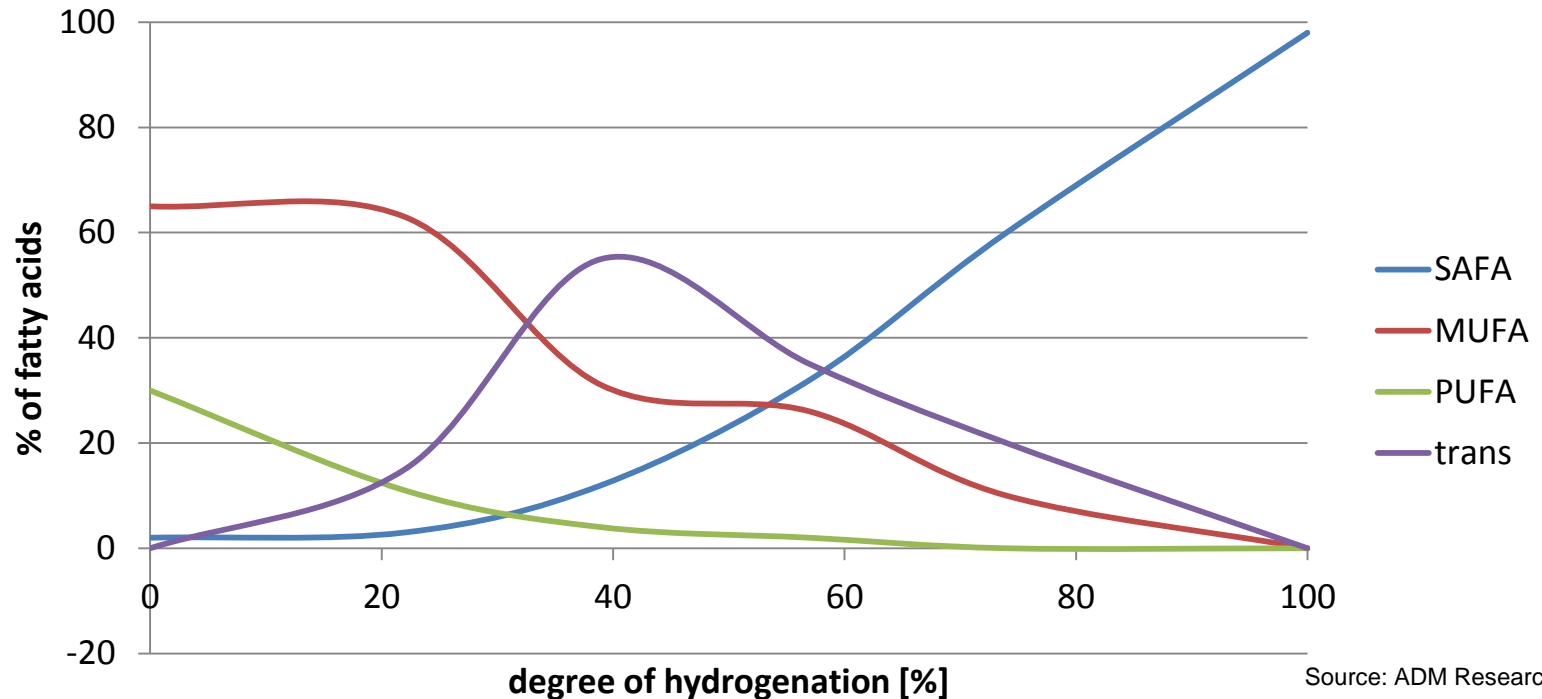
ALTERNATIVES BASED ON HYDROGENATED OILS

Example: Baking Fat with fully hydrogenated liquid oil



Source: ADM Research

Trans fatty acid development in hydrogenation



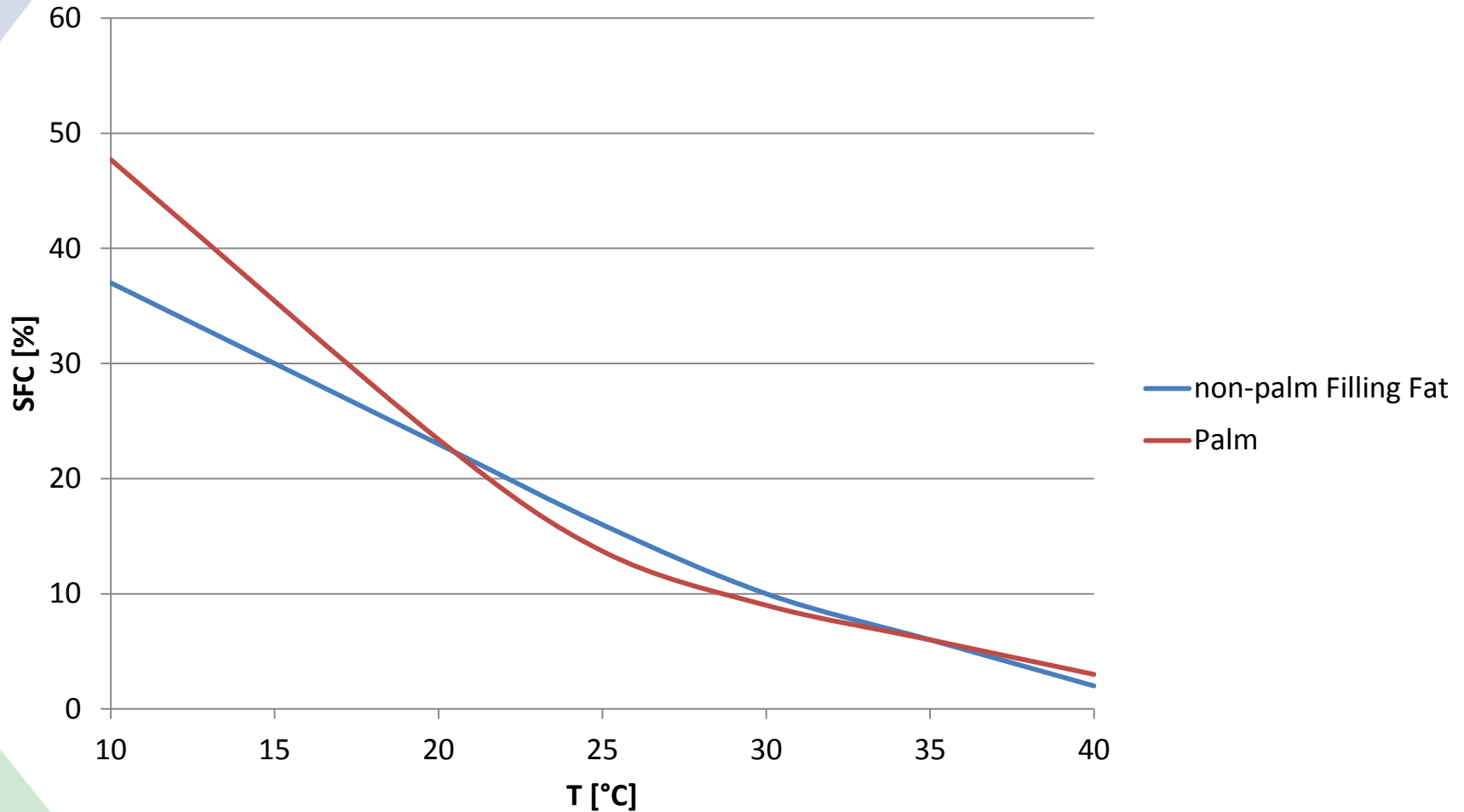
- Partially hydrogenated fats contain significant amounts of *trans*-fatty acids
- Fully hydrogenated fats contain no *trans*-fatty acids, but also no unsaturated fatty acids
- Going back to hydrogenation does not necessarily mean going back to *trans* fatty acids
- Still hydrogenation must be labelled

ALTERNATIVES BASED ON EXOTIC FATS

What are exotic fats

- Fat mentioned in the cocoa directive
 - Kokum
 - Shea
 - Sal
 - Mangokernel
 - Illipé
 - (Palm Oil and -fractions)
- Cocoa Butter

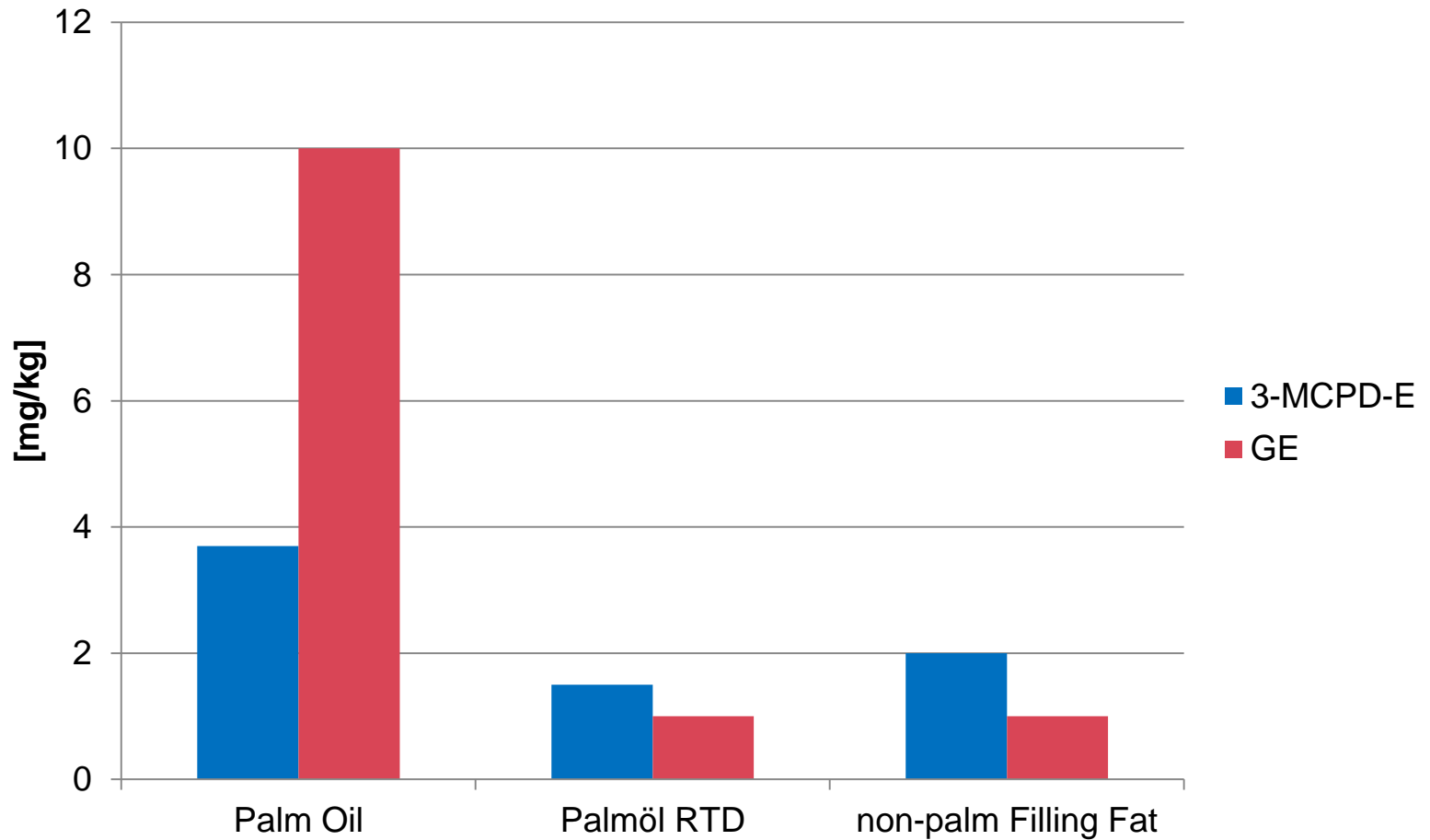
Comparison Palmoil : non-palm Filling Fat



„Hydrogenation“ labelling not required.

Source: ADM Research

Comparison Palm Oil : non-palm Filling Fat



Source: ADM Research

Drawbacks

- Major drawback of palm alternatives based on exotic fats might be the cost impact
- Due to expensive crude materials these products can be significantly more expensive
- Availability is limited (for example: Shea not grown in plantations, Illipé only flowering every 3 – 7 years)
- For some solutions tempering is necessary as per cocoa butter

Summary

3-MCPD/GE in refined oils and fats could be reduced by:

low-3-MCPD/GE palm products

Liquid oils which have naturally a lower potential towards 3-MCPD/GE

Fats based on fully-hydro oils

Fats based on exotic fats if “non-hydro” label is necessary

Combinations of all above

Some solutions might influence the performance, texture or structure

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Thank you!

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