



Sterol oxidation products in European feeding fats and oils

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Feeding fats and oils

- From animal or/and plant sources
- Contain mainly triacylglycerols, free fatty acids, phospholipids, soaps, sterols, etc
- Sterols are minor components and major portion of the unsaponifiable matter in fats and oils
- The major phytosterol are sitosterol, stigmasterol and campesterol
- Cholesterol is the main animal sterol
- Sterol in fats and oils undergo different chemical degradations during processing and storage and may produce toxic compounds (Figure 1)

Sterol oxidation products (SOPs)

Some cholesterol oxidation products (COPs) have been shown to be atherogenic, carcinogenic, mutagenic, cytotoxic, inhibitors of cholesterol biosynthesis. Phytosterol oxidation products (POPs) are thought to be harmful due to structural similarities to those of COPs. (Common SOPs are shown in Figure 2)

Factors affect on SOP formation during processing and storage of feed fats and oils

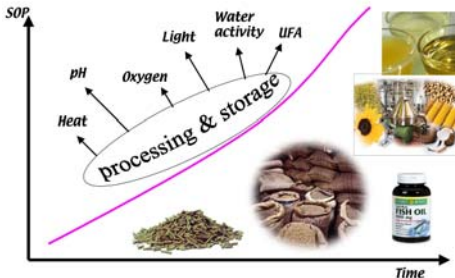


Figure 1

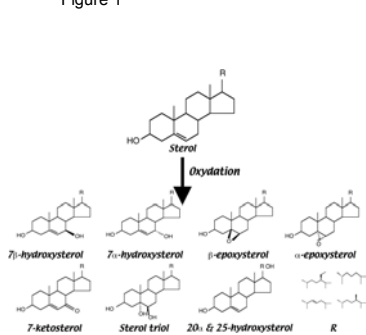


Figure 2 : Common sterol oxidation products

Conclusions

- The large variation of sterol oxidation products (SOPs=COPs+POPs) are due to the different processing methods, origin and nature of the products
- The variation in SOPs both in acid oils from chemical and physical refining processes possibly due to the difference in processing techniques
- The large variation in COPs in both animal fats and fish oils may be due to the amounts of cholesterol in those samples
- Presence of minor amounts of SOPs in lecithins and hydrogenated by-products may due to very little amount of sterols in this category
- In the categories of recycled cooking oil and miscellaneous sources contain mixture of both plant and animal fats. These samples also show large variation in the content of SOPs although the levels are quite low

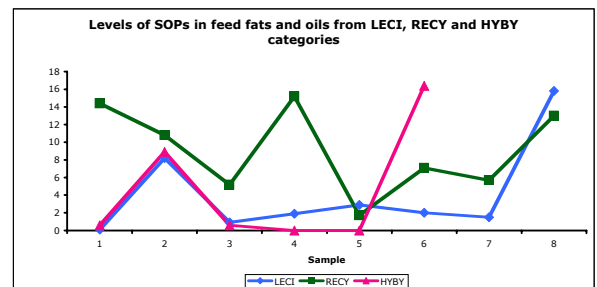
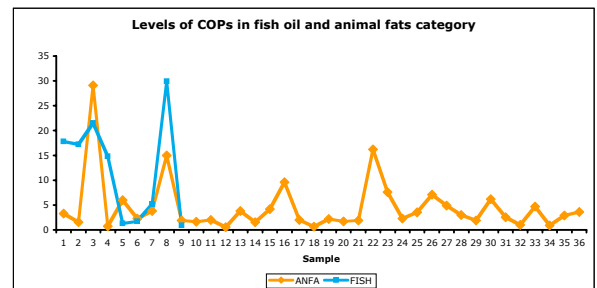
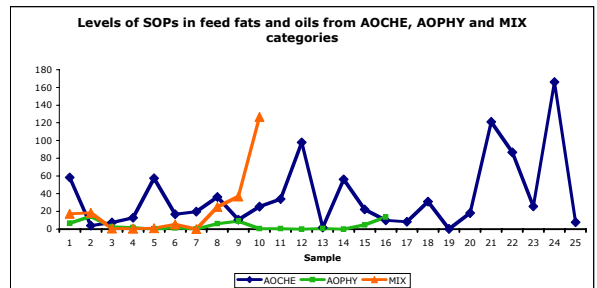
Acknowledgment

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About the project

- Main objective of this EU project is to develop an accurate classification of fats and oils used for animal feeding in terms of composition and contaminants
- Our contribution to this project is to evaluate the status of sterol oxidation by analyzing 10 different categories of feed fats and oils
- Collected feed fats and oils categories are: by-products or co-products of industrial fats and oils (acid oils, soaps, and hydrogenated oils); co-products from food industry (animal fats, fish oils and recycled cooking oils)

Results



AOCHE - by-products of oils and fats from chemical refining
 AOPHY - by-products of oils and fats from physical refining
 LECI - mixture of polar and neutral lipids recovered from some seed oils
 RECY - products from the collection of exhausted oils residuated from deep frying processes
 ANFA - fats and oils from rendering of animal tissues
 FISH - oils from rendering of fish wastes
 HYBY - hydrogenated acid oils from physical refining.
 MIX - all products that could not be classified in other groups