SOYA OIL—Summary of discussion

SESSION III A

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The discussion was led by E.A. Emken of USDA Northern Regional Research Center, U.S.A., and had as panelists all the speakers from Plenary Session III, ("Effects of Processing on Soya Oil" [Tuesday morning]), and those who presented papers in the round table of the afternoon.

Initial comments were centered on the round table papers. D'Alonzo recommended the use of Silar 10C glass capillary columns over OV 275 columns to effect good isomer separation. OV 275 capillary columns tend to oxidize with time and affect the separation. Another problem alluded to by the speaker was that of getting response factors for standards that are not available. He suggested getting a correlation for the available ones and to extrapolate the response factors for those standards not available. Frankl commented on problems encountered with different ozonolysis standards, particularly in the case of dienes.

There was a consensus among members of the panel that a misconception exists on what antioxidants can do; antioxidants would not rejuvenate mistreated oils. In the U.S., antioxidants are allowed for use in fats and oils up to 200 ppm (0.02%).

Although GPC (gel permeation chromatography) allows determination of the extent of oil polymerization caused by heating or oxidation, identification of polymers is not yet possible. Frankl said that during deodorization of the oil, temperatures of 200-230 C are reached starting heat polymerization. Also, oxidative polymers and heat polymers get mixed, complicating things more.

Jackson made several comments on techniques used for off-flavor identification. He was not aware of using milk as testing media for oil; however, he said the presence of water should be avoided when pure analytical techniques are employed. He stated that there was nothing wrong with using trapping techniques for oils, but he was concerned about reproducibility and quantification. Identifying important peaks by sniffing was not done for vegetable oils but has been done for dairy products. Gas chromatography/mass spectroscopy (GC/MS) could also be applied to component identification, as Jackson had shown that morning for soya isolates.

D'Alonzo warned against trying to correlate GC-calculated *trans* values with those obtained using infrared (IR) spectroscopy, particularly when the *trans* values are low. IR not only lacks specificity, but also is less accurate than GC. Besides, the IR methodology he had been using is an unpublished modification of the standard method. To improve recovery and resolution in GC, he advised the audience to change standard injection systems to one sold by SGE. Commenting on Frankl's attempts to identify polymers, he mentioned that infrared techniques did give a little more functional group information. As far as trapping techniques, he said, he had fed a computer system with the profile obtained by capillary GC and with flavor panel results for identical samples. Curve fitting done by multivariate analysis picked up those peaks that correlate better with off-flavors. He reported that with this procedure, important peaks have been identified and later corroborated by sniffing techniques. A last point was made that GC and sniffing techniques are much utilized in the case of essential oils, perfumes and citric acid.

SESSION III B

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The absorption and distribution of positional *cis* and *trans* octadecenoic acid isomers in lipids from rat, egg and human tissues were reviewed. Selected data on enzyme, single cell and whole animal studies with positional octadecenoic acid isomers were summarized and compared.

A major objective of commercial processing of soybean oil into edible products is to remove unwanted impurities from the oil with the least possible effect on the nutritional quality of the oil. Soybean oil is an excellent dietary source of the essential fatty acid linoleic acid and also of tocopherols, which serve as sources of vitamin E as well as natural antioxidants. The data presented indicate that the nutritional quality of soybean oil is largely retained as a result of typical commercial processing conditions. Hydrogenation does reduce the level of essential fatty acids; however, typical commercial salad and cooking oils and shortenings made from hydrogenated soybean oil retain nutritionally significant levels of essential fatty acids. Tocopherols also are present at high levels in the finished oil. Among the unwanted components of crude soybean oil that are effectively removed by processing are pesticide residues, phosphatides, free fatty acids, color pigments and compounds causing objectionable odors and flavors.

Butterfat has a unique place in the diet in India, despite, according to S. Mukherjee, its proven hyperchloresteremic responses. His studies in men and animals revealed a cholesterol lowering action of soybean oil when mixed with butterfat. He reported that interesterification with soybean oil caused structural changes that resulted in an even greater cholesterol lowering action of the treated fat.