PROCESSING—Summary of discussion

SESSION IIA

G.C. MUSTAKAS, Recorder, Northern Regional Research Center, Agricultural Research, Science and Education Administration, USDA, Peoria, IL 61604

Panelists were A.G. Gonzalez-Uriarte, K. Bader, W.M. Barger, Phillipe Van Dosselaere, D. Mendizabal, R.D. Moen, G.R. Thomas, L. Shoemaker, V. de Oliveira Shurmann and Chairman Frank Khym, all of whom had been introduced earlier in Plenary Session II or as a speaker in Round Table Discussion II A.

Phillipe Van Dosselaere opened the session with a paper on the storage of soybeans under a controlled atmosphere. He emphasized minimal humidity requirements of some stored-products insects and gave data on the consumption of nitrogen during purging of wheat bulks as affected by filling ratio in bins. He also discussed insect kill, utilizing carbon dioxide with exposures to 14 days and at varying concentrations.

Germination of soybeans and its modifying effects on the quality of full-fat soya flour was discussed by D. Mendizabal. The advantages of the process were evaluated by determining protein dispersibility, trypsin inhibitor, lipoxygenase activity, milling capacity and flavor scores during the different stages of the process. The study confirms the works of earlier researchers—i.e., that germination improves the quality of full-fat soya flour for food applications.

Near infrared reflectance spectroscopy instrumentation, and its applications in a soybean processing plant for better quality control, was discussed by R. Moen. Examples were given on how protein levels are monitored to provide information about the performance of the process.

The art of soybean meal and hull grinding was discussed by G.R. Thomas. This process step may be considered an art rather than a pure science, due to the need to properly blend all of the factors involved to produce the desired finished product. The grinding of soya meal as a protein supplement to animal feed is best achieved by using a side-fed mill, with plenty of air throughput and a large screen area. However, for the fine grinding of soya meal or isolate products (50 mesh or finer), an impact turbo mill with closely controlled clearance is generally used. Soybean hull grinding requires a mill with a high hammer tip speed, wear-resistant grinding elements, good air flow, and again, a large screen area.

Solvent safety in soybean extraction was discussed by L. Shoemaker. Nonflammable solvents other than hexane were mentioned, and reasons were given as to why these have not been used in the soybean industry. Normal hexane has the best compromise of solubility, low latent heat of vaporization, and boiling point range. Until another solvent that is not flammable meets these requirements, we will continue to have to work with the hazards of flammable solvents. The use of inert gases during the shutdown process, the explosive range of hexane in air, static electricity, and fire-fighting equipment were areas emphasized. A thought provoking comparison dramatizing the potential hazards of hexane was given by the speaker, who stated that 20 gallons of hexane is equivalent to 1 lb of TNT in explosive power.

SESSION IIB

H.J. DUTTON, Recorder, Northern Regional Research Center, Agricultural Research, Science and Education Administration, USDA, Peoria, IL 61604

A wide range of intense interests was shown in round table papers on processing. The bleaching operation was reviewed not only in regard to classical refining, but was also discussed in regard to its role in physical refining, in pre- and post-hydrogenation steps, and in relation to energy and other economic factors.

Preliminary experiments are raising new questions concerning selectivity of nickel hydrogenation catalysts as affected by the concentration of catalysts. The effects of variations in the oils to be hydrogenated upon catalyst selectivity were also observed. Extensions of the results presented may be expected at future meetings of the AOCS.

In addition to these theoretical considerations of hydrogenation, practical application of the hydrogenation unit operation was discussed particularly in relation to the characteristics of nickel hydrogenation catalysts that are critical in plant practice.

Physical refining (steam refining) seems to hold numerous advantages over classical caustic refining in terms of economics and in directly yielding free fatty acids (85%), which are immediately marketable.

Novel twists in the time-honored methods of chilling and crystallization appear to be on the horizon. New designs, static mixers and simplified refrigerant systems are among the features to be incorporated in unit operations of the future.

Soybean oil of high quality can be and has been produced by a small plant in Venezuela for over a decade and this success should encourage other small business operations throughout Latin America to turn to soybeans as a reliable source of raw material.

Whereas the use of soybean oil in inedible applications amounts to less than 5% of its consumption in the United States, there are expanding outlets for soybean oil as a source of industrial chemicals, and new research products are "on the shelf," awaiting the time and the economic conditions when they can become alternative resources to petrochemicals. Further information on this topic is available in Chapter 21 of the "Handbook of Soy Oil Processing and Utilization" given to each registrant, and in "Fatty Acids," a new book edited by Everett H. Pryde and published by the American Oil Chemists' Society.

Progress is being made on ecological and environmental problems of the soybean oil refining operations. New electrochemical treatments of wastes provide higher recoveries of waste products and subsequently less load on sewage treatment plants.

The written questions submitted to the plenary speakers reveal that their presentations contained vital and new information–some not recorded previously, some included for the first time in the "Handbook." Formulation of hardened products from soya oil was such a topic. Refining of soybean oil was the subject of many inquiries, i.e., specifications for crude and refined oils in terms of pigments, peroxides, phosphorus, soap, free fatty acids, and trace metal. Green oils and characteristics of reused catalysts were other areas of interest which are covered in the "Handbook."