SOYA PROTEIN—PRODUCTS—Summary of discussion

SESSION V A

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This round table was entirely devoted to presentation of the State of Guerrero's program on minimum cost and balanced foods based on soybeans. This program introduced soybeans to rural communities in 1977, under the following three postulates: (a) complementation of a maize-bean based diet with soybeans; (b) development of minimum-cost foods; and (c) substitution of soybeans for less profitable crops.

The program proceeded through two stages. Initially, local cadres were trained in nutrition, health and social services. Then the program was launched, introducing soya into regional dishes, originally through 10 recipes that have since increased to 250.

State authorities are very satisfied with the results. Reportedly, mortality rates as well as morbidity and tuberculosis have been reduced, and birth rates have increased. The program is estimated to cover 3.6 million people.

Unique to this program has been the introduction, by small-scale techniques, of green soybean pods *(ejotes)* into popular dishes. Soybeans harvested after 75 days, instead of the 95 required for full maturation, had the same nutritive value as mature beans. Soaking for 8 hr followed by a 30 min boil inactivated trypsin inhibitors, giving a PER equivalent to 69.4% of that of casein. A so-called soybean variety for human consumption has been developed by crossing soybean lines "Selected Kahala" and "Lee 68." It was registered on March 31, 1980, at the Ministry of Agriculture in Mexico as ISAAEG-BM-2.

The ISAAEG-BM-2 variety is reported to be mild in flavor, and the heat treatment commonly applied to denature antinutritional factors completely eliminates the "painty" flavor. It has a lower oil content than commercial varieties that are bred for higher oil yields and has nonshattering properties. Experimental plots now extend to 8 ha with yields of 10-12 ton/ha of green pods plus 20 ton/ha of associated forage or 3-4 ton/ha of dry beans.

Green pods used for self consumption have a cost of 12 cent/kg and the calculated cost of soybean milk is 6.5 cent/ℓ. Seeds and beans are sold at state health centers year round.

The program has been concentrated in rural communities. Demonstrations were made daily at Los Organos J.R. Escudero, a village of 1900, located 20 km east of Acapulco. Tacos, enchiladas, soya milk and soya-fortified donuts were prepared locally and presented for degustation by participants who were very impressed with the quality of the products served.

The future of the program is uncertain. Continuation and expansion of the work is contingent on the availability of funds to multiply the seed and to go for larger scale operations.

SESSION V B

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Panelists were J.C. Morales, J.T. Lawhon, A. Camacho Griensen, W.J. Hoover, A.G. Langsdorf, and Chairman J.G. Endres, all of whom had been introduced earlier in connection with participation in Plenary Session V or as speakers in Round Table Discussion VB.

J.C. Morales discussed utilization of soya protein in the development of highly nutritious, low-cost products in Mexico. This includes such applications as tortilla fortification; extension of animal protein; combinations with other ingredients to prepared formulated proteins; and applications to improve functional properties rather than nutritional ones.

J.T. Lawhon described the production of food ingredients from whole soybeans by aqueous processing and the isolation of protein from soy flour by ultrafiltration membranes. These relatively new techniques may offer certain advantages, since aqueous processing requires no petroleum-based solvents to extract the oil component. They also offer opportunities for removal or deactivation of undesirable constituents of raw materials with appropriate water-soluble chemicals. However, these techniques are less efficient in oil extraction, and demulsification is required to recover clear oil when emulsions form. Ultrafiltration processes recovery protein directly from soya flour extracts and thereby avoid generation of the whey that results from the conventional isoelectric precipitation. Extracts from whole soybeans have been membrane-processed with and without separating the oil to produce a variety of new soy protein ingredients.

Camacho Griensen Armando summarized the work of CIATECH (Centro de Investigaciones y Asistencia Technológica del Estado de Chihuahua) in producing nutritional foods at low cost in Chihuahua, one of the areas of Mexico where malnutrition is a problem. After extensive research, CIATECH decided to work on the design and construction of soya processing plants utilizing extrusion procedures. Their main goal was the production of high-protein, low-cost food products utilizing full-fat soya flours. Three plants were set up to produce full-fat soya flour, soya-based drink and milk extender, enriched corn flour and enriched oatmeal. While working with low-cost extruders having various capacities, they also have become involved in cooperating with nutrition programs in Costa Rica.