Introduction of Soybeans in the Diet of the People from Guerrero

R.N. GUTIERREZ, Coordinated Services of Public Health in the State of Guerrero, Mexico

Through specific programs, the Coordinated Services of Public Health of the State of Guerrero carry out 20 of the 21 chapters of the National Health Plan, which has two main goals: (a) to maintain good health conditions, and (b) to improve sanitary conditions in the places where the people of Guerrero live and work. The state of Guerrero is basically rural, and since the start, we have tried to institute rural development as a working standard.

Six years ago the socioeconomic situation in the state was chaotic, due mainly to guerrillas, international drug traffic, diminished productivity and serious administrative disorders in public and private sectors. Events such as thefts, kidnappings, murders, frauds, attacks on buses and their passengers, abductions and violence were daily occurrences. It was depressing to see the inmates of the old people's home in Chilpancingo go out in the streets to beg alms in order to survive, while undernourished people, beggars and prostitutes paraded in the streets. Besides the serious and frequent epidemics that decimated the communities, among the most common problems were hunger and undernourishment, due mostly to protein and caloric deficiencies.

In the neediest communities, the programs proposed by various institutions to improve nutrition were received with surprising indifference. The residents freely received food, which they demanded from anybody in an official position, but they would not even listen to any new programs, nor would they participate in them. There were only two sides: the community that demanded and the public officials who gave.

After some trials that produced good results, we chose the soybean in association with corn to correct the protein and caloric deficiencies because of the following important characteristics.

The basic nutritional element comes from corn which is almost always eaten with beans, and which together provide enough calories, but lack all the necessary amino acids. There are communities where only corn is consumed for long periods of time, thus producing a lack of essential proteins. Consumption of soybeans with corn or beans, however, supplies enough necessary amino acids.

The cost of these foods is so low that there is no other cheaper food substitute in animal proteins, which have a high cost and can be kept only for a limited length of time under refrigeration.

By using simple methods, the people of Guerrero know how to raise and keep corn and beans, and with elementary training, they can raise and keep soybeans efficiently.

INSTITUTING SOYBEAN PROGRAMS

There were several negative factors in the introduction of soya to the diet. We lacked the economic resources, the fertile seed and the technicians experienced in its cultivation. Other institutions had tried to introduce soybean farming with little success and the communities "did not want to engage their lands sowing a crop that might leave them foodless."

Our only sure thing were two premises: (a) for the nourishment of the people of Guerrero, the soybean was the solution to the protein and calorie deficiency; and (b) to introduce the soybean, it was necessary to raise it in the state itself.

So it was decided to introduce soybean farming in two stages. In the first stage, personnel from the health centers of the 29 sanitary jurisdictions that covered all the state were trained, instructed and capacitated at the Superior Institute of Agriculture and Cattle of the State of Guerrero. This group was made up of the Nutrition Auxiliary, the Social Promoter, the Social Worker and the Chief of Nurses. They were trained to store, manage and sow the most fertile seed, process the soybeans with the implements available in any regular kitchen, and to prepare 150 regional dishes based on the soybean. Thus, the production and use of the soybean were introduced into the offices of the Coordinated Services, which cover the State.

In the second stage, the trained personnel began to introduce the following five programs to different communities: (a) complementing the soybean that was cooked in salt water with the corn tortilla (soybean tacos, with 13% protein); (b) preparing the common bean mixed 50:50 with soybeans, in the traditional way of the farmers; (c) adding 15% soybeans to the corn to be used for making tortillas; (d) preparing 150 regional dishes with soybean; and (e) substituting soybeans for the low-yield crops.

SEED

During the rainy season of 1976, eight acres in Quechultenango were sown with MBI seed from ISAAEG, which was bought in the state of Morelos with personal resources from the Headquarters of the Coordinated Services. This way, the fertile seed that was introduced in the state of Guerrero in 1977 was obtained.

RESULTS

Nutrition

The positive role that the soybean plays in nutrition is well known. However, the scarcity of fertile seed continues to be a limiting factor, along with the dependency on rains, which is inherent in soybean cultivation. Under these circumstances, many communities carry out their programs only intermittently; even so, a better degree of nutrition can be observed in these areas, and marasmus and kwashiorkor have disappeared and there are obvious signs of improvement in nutrition and health.

Health

Mortality. We have established an obvious relationship between the introduction of soybean in the diet and an emphatic decrease in mortality. The observations in the community of Los Organos, Municipality of Acapulco, show the following mortality rates (x 1,000 inhabitants): 1976–11.7; 1977–19.9; 1978–5.5 (introduction of soybean); and 1979–9.2.

In this community, nothing has changed besides the introduction of soybean–not the socio-economic situation, not living conditions, nor the primary attention to health. The situation has remained unaltered in the last five years.

The emphatic decrease in mortality after the introduction of soybean in the diet seems to be caused by the increase of the body's resistance to illness, which happens when mortality decreases and morbidity increases, and to a decrease in the contagion of some sicknesses such as tuberculosis in the case of Taxco.

Natality. In Tlapa, Huamuxtillan and Taxco, there was a direct relationship between the introduction of the soybean and an increase in natality; but in Arcelia, which did not receive soybeans, natality, actually decreased slightly. Because of this, the introduction of soybean is followed by family planning programs. Mention should be made that some statistics for 1975 were obtained under abnormal conditions, due to the socio-economic disorders of that time. Besides, when soybeans were introduced one year and not introduced the next, due to the lack of seed, the community produced variable amounts of soybeans, which prevented us from including or excluding it as a soybean producer.

Morbidity. Notwithstanding the fact that morbidity is subject to various factors that can alter it at any time, in some contagious diseases the addition of soybeans to the food obviously reduced the frequency of contagion. Because of this, it appears that the decrease in mortality that occurs when soybean is added to the diet results in not only better resistance of the body's defenses but also a decrease in the morbidity rate as well. In the case of pulmonary tuberculosis, the results have induced us to include a diet with soybean in the treatment of patients with that disease. The observations made in Taxco are very illustrative. In 1976, the number of cases of tuberculosis in the rural areas more than doubled those in the urban areas. In 1977, with the introduction of soybean to the diet, the frequency of tuberculosis in the rural areas was less than in the urban areas, where such programs were rejected. The next year the promotion of soybean planting in the rural areas was suspended, and the frequency of tuberculosis in the rural areas and in the urban areas increased proportionately. The year after, the programs were again instituted and a definite decrease in the rural areas was observed while the rate in the cities continued increasing.

Utilization of Soya Protein in Highly Nutritious Low-Cost Products in Mexico

J. MORALES, H. BOURGES, and **J.L. CAMACHO,** Instituto Nacional de la Nutrición (INN), División de Nutrición, Viaducto Tlalpan y Av. San Fernando, México 22, D.F.

INTRODUCTION

Since 1972 the National Institute of Nutrition (Mexico) has conducted a research program of food technology that is of social interest, sponsored by PRONAL (Programa Nacional de Alimentación). The objective of the program is to develop and promote products and techniques that may help to improve food consumption in those population groups which are presently inadequately fed. The main line of research involves formulation of low-cost, easily preserved, highly nutritive products. Protein content and quality has received special attention. The program uses those materials which are economically more convenient at a given time. In general, soybean protein has been preferred because of its high-protein content and quality, and its supply of energy as oil. Furthermore, it is immediately available (1.5 million tons from production and imports); it has a long tradition as a human food; and it has as low a cost per gram of protein as do beans. Other potential protein resources such as leaf, single cell, fish meal or insects, do not have all the advantages cited, either economically or sensorially.

Efforts to use soybeans in nutritional programs started in Mexico in the 1930s (1-4); it was, however, only in the present decade when research in this field multiplied, and when several companies in Mexico started the production of different soybean products.

From the point of view of nutritional programs, soybeans may be used: (a) to increase the protein content (enrichment) and quality (complementation) of low-protein foods such as cereals; (b) to extend animal products already rich in protein; (c) as the main ingredient of a product; and (d) as a functional ingredient resulting in enrichment, complementation or extension. PRONAL has sponsored research in all of these lines.

The principal products using soya for enrichment and complementation are summarized in Table I. This procedure using soya is applied fundamentally to cereals. It is based on the technical development of various derivatives of soybeans and on the capacity it has to complement cereals, which are the primary foods for populations that suffer from malnutrition. In essence, these products enriched by soya are mixtures in which the levels of added soybean varies from 8%, in the case of tortillas, to 60% in infant purées (5). These mixtures are processed through diverse technical procedures such as lime treatment, by which corn is processed for the preparation of tortillas. Elimination of the antiphysiological factors of soybeans was achieved with this treatment, consequently increasing its protein quality. Extrusion was used for development of pastas, and thermal treatments in autoclave were used in the case of beverages and infant purées (6-9).

The protein contents and the nutritive values of these products are also shown in Table I. In some cases, such as with tortillas, an increase of 100% in the concentration of utilizable protein was achieved and the protein quality increased by more than 50%. In other products, especially in infant purées, the protein content was increased by three- or four-fold, in comparison with commercial products with a protein quality comparable to that of animal proteins (10-12).