DISCUSSION REPORT

(Discussion of paper presented by L.G. Elias and R. Bressani)

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I wish first of all to congratulate the authors Messrs. Elias and Bressani for an excellent paper and Dr. Elias for an interesting and stimulating presentation.

In my review of the paper I would wish to highlight the salient points and emphasise those which I feel would engender further discussions.

In its introduction the paper draws attention to the changing world food situations with respect to supply and cost, and emphasises the need for self-sufficiency in at least the basic staples, pointing out that indigenous and customary foods may lack essential nutrients. Thus, the paper warns, that the replacement of cereal grains by roots and tubers may further result in protein deficiency, since the latter is low in protein content, further indicating that the concept of self-sufficiency often implies the economic aspects but not the nutritional. Nevertheless, it is pointed out, that the use of food science and technology in the development of indigenous foods would make it possible to produce highly acceptable and nutritionally good foods from indigenous sources. We would wish to add that when the economic aspect is being considered, attention be also given to the social gains to be derived in the expanded development of an indigenous food, such as employment, development of a technology, conservation of foreign currency, and the psychological satisfaction of self-sufficiency.

The paper discusses two main themes *composite flour* and *novel protein source*.

Composite Flour

The authors have used the F.A.O. definition for composite flours, a definition used in its widest sense, thus avoiding any confusion that may arise in its meaning. Thus the composite flour may be made by dilution of a wheat flour with non-wheat flours, or a mixture of non-wheat flours.

The authors clearly demonstrated the nutritional similarity between wheat and other cereal grain showing that replacement of wheat by tropical cereals would result in equal or slightly better nutritional characteristics. This argument is well supported by Table 2. It should be of interest to note that the tropical cereals Opaque-2 corn, and rice are superior to wheat, because of their higher lysine content which is the limiting amino acid in cereals.

The implication is quite clear, with greater demands being made on the global wheat supply and higher prices, one would wish to see greater effort being placed on the development of larger quantities of tropical cereal grains such as rice, corn, sorghum and millet as replacement for wheat, particularly since wheat is the greatest single

item in our Food Import Bill, $94.8m. in 1972.

However, one must appreciate that better nutrition and self-sufficiency is not enough reason for the acceptance of new food by the population. The change in eating habit as well as the technology of production from an established habit to a new one will have to be introduced gradually and carefully. Thus, if we wish to make a change we would have to begin now by dilution of wheat flour with tropical cereal flours in the production of the conventional bread, increasing the dilution as we increase production of the indigenous tropical cereal flours.

The authors discussed the use of root crop flours in composite flours, pointing out the lower protein content and lower biological utilization as an energy source. The protein content of various root crops are given in Table 3. It should be noted that chayote *(Sechium edule)* is not a root but a fruit. It is called cho-cho in Jamaica and christophene in the Eastern Caribbean.

I wish to strongly support the suggestion made by the authors that we should endeavour to determine the amino acid profile of our root crops, not only with respect to composite flours, but mainly because they form a basic part of the diet of most of our people, particularly the rural poor. Attention must be drawn to the excellent work done with yams by Martin and Thompson (1973). In considering the protein content of root crop flours, one must be careful in extrapolating results, since different cultivars of the same root crop have been shown to have different protein content (Sammy 1972). Sammy has shown through a study of 17 sweet potato cultivars, for use in composite flours for bread-making at the 15 per cent substitution with wheat flour gave varying results. The results of the quality of the bread varied from better than to poor as compared with bread made from 100 per cent wheat flour. A direct relationship exists between baking properties and protein content of the sweet potato flour.

Work done (Sammy 1971) at the University of the West Indies, St. Augustine, Trinidad, has demonstrated the successful use of sweet potato (049) flour and yam *(D. alata)* flour for replacement at the 15 per cent and 20 per cent levels in bread and other baked goods. The use of breadfruit was successful only at the 5 per cent level. However, reports from Jamaica and St. Vincent have reported successful results in bread-making at the level of 15 per cent dilution with breadfruit flours and green banana flour.

A comparison between tropical cereal flour and root crop flours would show that the tropical cereals have considerable advantages, not only with respect to its nutritional value, low moisture content and their better storage capabilities, but also because of its lower processing cost and higher flour yields. The flour yields from sweet potato and yams are 30-33 per cent and 20-15 per cent, respectively.

Novel Protein Sources

The novel protein sources quoted in the paper are the non-conventional legumes and oil seeds which have been in use as a source of food

by many Third World peoples. Therefore, as a food it cannot be considered as novel; possibly its use in composite flours may be considered as such. The authors recognize the privileged position of soyabean as a source of edible oil and vegetable protein and the effort being made to develop this crop for the tropics. Table 6 gives a comparison of composition of three commonly used legumes with soyabean.

The paper then goes on to discuss the extraction of a protein isolate from cowpea, this isolate had a protein content of 60-70 per cent. The object of the extraction is not quite clear. If the use of the isolate is in composite flour or in soup, then it would seem unnecessary. The use of legume flours as a source of protein to enrichen bread and pasta products made from composite flours is well established. An area of interest for the Caribbean would be the use of cotton-seed meal as a source of protein for human consumption, since cotton production is once again gaining prominence in the West Indies.

An area not mentioned in the paper is the production of breakfast foods. Work in progress at U.W.I. has demonstrated the use of soyabean and pigeon peas in the preparation of a number of breakfast foods of the cornflake and porridge types using sweet potato, yam and breadfruit as the carbohydrate base. The products had a protein content of 12-20 per cent with a high acceptability. Since no nutritional studies were carried out on these products, nor did we know their amino acid profile, we are unable to comment on their nutritional value.

A point that needs to be emphasised is the difficulties encountered in the translation of research results to application. There is little or no mechanism for doing this. The need for some such mechanism is long overdue and something needs to be done early if we are to reduce our high food import bill which for wheat and wheat flour alone amounts to some TT$100m. for the Caricom territories alone and some $300m. for the Caribbean. It therefore becomes necessary that we begin to reorient our eating habits so as to change from a foreign staple (wheat) to an indigenous one, be it tropical cereal grains, root crops or legumes or a combination of these.

References

Martin, F.W. & Thompson, A.E. (1973). "Protein Content and Amino Acid Balance of Yams." *J. Agri. Univ. Puerto Rico,* 57, 78.

Sammy, G.M. (1970). "Studies in Composite Flour: 1. The Use of Sweet Potato Flour in Bread and Pastry Making." *Tropical Agriculture Trinidad.* 47, 115.

_____. (1972). "The Status of Composite Flour Research at U.W.I., St. Augustine, Trinidad." Paper presented at the International Conference on Production and Marketing of Composite Flour, Baking and Pasta Products, Bogota, Colombia.