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THE SCOPE FOR THE DEVELOPMENT OF FOOD PROCESSING

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Introduction

Food is one of the basic necessities of life, and as such, no nation should permit itself to become too dependent on others for its basic food supplies.

There can be no doubt that the English-speaking Caribbean is heavily dependent on imports for its basic food supplies. Data¹ obtained from the CARIFTA/CARICOM secretariat shows that in 1972 the region imported a total of \$507m. (EC) worth of food of which \$73.1m. (EC) or 14.4 per cent were intra-regional. Thus, total foreign imports amounted to \$434.5m. A breakdown of this shows that extra-regionally we imported \$94.8m worth of cereals (mainly wheat and wheat flour), \$87.0m. worth of meat and meat products, \$43.0m. worth of fish and fish preparations, \$48.5m. worth of fruits and vegetables, \$11.4m worth of sugar and sugar preparations, \$12.7m. worth of coffee, tea, cocoa and spices, \$93.0m. worth of dairy products, honey etc., \$16.0m. worth of miscellaneous foods and \$26.8m. worth of animal feeding stuffs. These figures alone should be enough to demonstrate the scope for food production and processing for domestic consumption within the Carifta region. Production for export will greatly increase the scope.

Historical perspective will help us to understand the reasons for our heavy dependence on foreign sources for so large a portion of our food requirements and our lack of processing technology. As colonies we were producers of raw materials and consumers of processed goods. Thus, past political and economic conditions did not encourage the development of processing or manufacturing skills. This is best put in *Carifta and the New Caribbean*, where it states "the domestic agricultural sector (producing food and livestock products for the local and regional markets) is in a very underdeveloped state, and this results in very high and growing levels of imports of food from the outside world".

This tendency has continued and even today among the independent members of the community this is still the case. Attempts to solve the food problem have not received the attention it deserved. Renewed efforts

¹ Private communication with CARIFTA/CARICOM secretariat (1974). The figures given do not truly represent the period 1972, and are an under-estimation. Data available at present are as follows: Grenada (1968), Antigua, Belize and Dominica (1969), Barbados, St. Lucia and St. Vincent (1970), Guyana (1971), Jamaica, Montserrat, St. Kitts/Nevis/Anguilla, and Trinidad & Tobago (1972). For ease of discussion we have assumed a static condition for the period 1968 to 1972, so that no adjustments were made to update these figures.

have been made within the last few years, and this was only because of a world shortage of basic staples, rising prices and an energy crisis. The present world shortage of wheat and other grains both for human food and animal feed has strongly emphasised the need for us to produce a greater portion of our own food requirements. The present world food shortage may yet be a blessing in disguise.

The Present State of Out Food Industries

Food today is the world's largest industry and it is expanding every year. Food processing and preservation are therefore essential parts of the economic development of any nation (1).

Because of an increasing population and an increasing standard of living, the demand for food has been steadily increasing but unfortunately local production has not kept pace with demand. Thus, total food imports for the region rose from \$38.0m. before World War II to \$245m. in 1964 (2) then again to \$507m. in 1972, an increase of 107 per cent for the 8 year period 1964-1972. During this same interval total cereals import rose from \$82.0m. to \$139.0m. or an increase of 69.5 per cent, while fruits and vegetables rose from \$20.0m. to \$56.9m., an increase of 184.5 per cent. The intra-regional imports for the same commodities for 1972 were 24.7 per cent and 15.0 per cent respectively - a clear indication of heavy foreign dependence.

After independence the independent territories became aware of the high food import bills and initiated the establishment of food processing industries by providing incentives such as tax holidays, protection from competitions, and soft loans. It was hoped that as soon as these processing units became viable they would generate the production of locally produced raw materials. This hope has failed to materialise and after about 10 years we are still importing between 70 to 80 per cent of our raw materials for the food processing industries.

The Third Five Year Plan, 1969-1973 of the Government of Trinidad and Tobago clearly defines the problem in Chapter XIII, section 129, where it states, "*In recent years there has been increasing activities in the field of food processing. Several plants have been constructed to process peas, beans, and other vegetables and produce soups, jams, jellies, juices, nectars, dried and salted products and tomato catsup. In many cases, although locally produced materials are utilized, a high proportion is still imported, thus minimising the economic benefits that should accrue to the country because of the establishment of a food industry.*" Thus it would seem that the food processing industries in the independent territories are little more than packaging plants. The benefits accruing from these are, at best, minimal and in some cases negative.

The situation in the Associated and Dependent states is even worse, in that although they are solely dependent on Agriculture they have very little or no processing industries.

Potential for Food Processing Development

The potential for food processing development exists in two areas, namely, domestic consumption and export. The scope through domestic consumption is indicated by the large food import bill, while the scope

through export is yet to be fully investigated. However, indications are that there is a ready export market for good quality processed tropical fruits and vegetables in North America and Europe. Past experience to exploit this market has failed, mainly because of a failure to maintain supply and quality.

The first requirement in any food industry is the raw material supply. To begin food processing without an adequate supply of locally produced raw material would be wasteful, since in most cases it would be cheaper to import the processed product than to produce it locally from imported raw materials. Thus the foundation for the development of a food industry must be laid on:

- (a) an adequate and reliable source of locally produced raw material at reasonable cost;
- (b) a knowledge of the proper processing technology; and,
- (c) proper packaging, adequate promotion and marketing.

Except for the export crops, there is little or no organised production of food crops. The development of the processing industry will therefore depend on the scale and rate of development of each food-crop to be processed, which in turn will depend on existing and potential markets. Since production of raw material and processing must be established almost simultaneously, then the market potential will determine the scale of the processing plant to be established.

In many cases markets will have to be explored first, before full-scale development can take place. Thus initially, small scale plants with room for expansion would seem a logical choice. Small improvements in agriculture, in manufacturing methods and marketing stand a better chance of enduring than large revolutionary changes, which in a developing nation are likely to be premature.

Cereals

Cereals are the main staples in the West Indies; they are made up of wheat, rice and maize, of which wheat accounts for the greatest quantity imported. The total cereal import for 1972 was \$139.3m., \$44.5m. being intra-regional while \$94.8m. being extra-regional. Within reasonable limits we may assume that the extra-regional imports were for wheat and wheat flour only. Having made this assumption we may now proceed to consider the replacement of this imported staple by an indigeneous one.

Wheat is an imported West Indian staple, but a temperate plant and therefore cannot be grown in the tropics. It is a well established food, that has suppressed the development of an indigeneous carbohydrate staple other than rice. Nevertheless, the time has come when every effort must be made to displace wheat by an indigeneous carbohydrate source taking into account the nutritional implications.

Complete replacement of wheat at present may not be feasible; however, with careful long-term planning complete replacement seems quite possible. Before complete replacement can be achieved it would be necessary to conduct intensive research in order to select the best carbohydrate sources available economically and culturally. This must include a search for suitable tropical cereals such as maize, millet, sorgham, and in the case of rice we must initiate a programme to increase production throughout the region.

Fruit and root-crop sources must be investigated. In this respect the root crops yam and sweet potato are at present being studied by the Food Technology Section of the Department of Chemical Engineering at the University of the West Indies at St. Augustine. The study in *composite flours* has established the use of both sweet potato and yam flours in bread and pastry making (5 & 6). Composite flour containing 15 per cent sweet potato flour or 20 per cent yam flour produced bread of high acceptability using conventional baking methods. When one considers that the Carifta region spends more than \$94.8m. per year on wheat, one should appreciate that if we substituted only 10 per cent of this we would be saving \$9.48m. per year in foreign currency.

There has been much discussion on the adverse nutritional effect this would have among the low income people. We should therefore examine this, assuming no protein fortification. The bulk of flour used in the region has an average protein content of 10.6 per cent, while sweet potato and yam flours contain 4.0 per cent and 7.0 per cent protein, respectively. A composite flour containing 90 per cent wheat flour and 10 per cent sweet potato flour will have an approximate protein content of 9.76 per cent, a loss of only 0.84 per cent. However, when yam flour is used instead of sweet potato flour then the protein content goes up to 10.42 per cent, a loss of merely 0.18 per cent. Are these losses really significant? The gain in foreign currency would be \$9.48m. If we now plough back this sum into production of these root-crop flours we would be creating employment, and when we consider the multiplier effect of internal money circulation the overall effect would be much greater than \$9.48m.

On the other hand we may wish to fortify our carbohydrate source. This can be done by the addition of a legume flour, or cottonseed flour or fish protein concentrate. Such systems are well established so there will be no problem. If we now add 5 per cent soya or any other legume flour to our composite flour we will increase the protein content to 11.11 per cent for soya and 10.51 per cent for any other legume (assuming soya flour to contain 35 per cent protein and any other legume 22 per cent). At present only partial replacement of wheat seems possible, because it will not necessitate a change in eating habit or technology of production. However, the aim should be complete replacement in stages. Replacement of wheat flour greater than 15 per cent to 25 per cent will necessitate the development of a new food, with new eating habits and new methods of production. We should begin now, to develop this new food, and new technology of production so that it could be gradually introduced to the Caribbean peoples. We at the Food Technology Unit at U.W.I., St. Augustine are working on such a product and feel confident that it can be achieved. We also feel certain that the Caribbean peoples will accept such a change, since it is not far removed from *cassava farine*, except that it is more nutritious and more tasty. *Cassava farine* is still used among many of our people.

Extensive export potential for tropical cereals need not be considered at present since it will be a long time before we become self-sufficient in this commodity for human and animal food. There is a small export market for fruit and root-crop flours, among national food fadists, and should be exploited.

Fruit and Vegetable Processing

The potential for fruit and vegetable processing exists both for the regional market and for export. However, there is need for careful planning and development if it is to materialise. At present the main problem is one of raw material supply, but a raw material supply can only be developed when there is a stable market.

The author does not agree with some of the views expressed in the Eastern Caribbean and British Honduras Industrial Survey: Prospectus for Canning Fruits and Vegetables (5) when it states "canned tropical fruits have limited prospects in CARIFTA"; it further states: "popular canned fruit items on sale in CARIFTA are mostly of types where raw materials cannot be grown locally for climatic reasons. Therefore import substitution opportunities in respect of canned fruits are strictly limited." This same trend prevails for the canning of vegetables, e.g., it states: "several popular canned vegetable items in rely on produce which cannot be grown locally." This report clearly states that the potential for fruit and vegetable processing in the Eastern Caribbean is at present negative. Such documents can have harmful effects on the development of a fruit and vegetable processing industry in the Eastern Caribbean. These findings are based on the present non-existent raw material supply and the prices quoted are for the fresh fruit market, while the expectation is for a high profit return on investments almost immediately.

On a monetary profit-making basis, the report is factual. However, the potential exists for the development of our natural resources of both materials and people. It is necessary for the foundation to be laid now with the full understanding that in the initial stages of development of the industry there would be need for support. If the industry is left in the hands of the get rich quick entrepreneurs, then its development and growth will be haphazard and its full potential will never be realised.

In order to exploit the potential that exists it is necessary for some form of organised production to be instituted. This is fully discussed and solution proposed in the paper - Food Processing and the Interdependence on Agriculture and Industry by Cropper, Sammy and Wiltshire (6). This paper proposes a development strategy for linking production with processing under the following headings:

- (a) justification for the study of any particular crop;
- (b) specification of the product proposed;
- (c) development of the production system;
- (d) development of the processing system;
- (e) pilot production and processing; and
- (f) test marketing.

Application of this scheme should be able to identify prospective crops.

Where raw material supply is limited and market potential uncertain, small-scale operations should be introduced. This will provide the opportunity for investigating raw material expansion and market testing and development before full scale expansion.

Experience has shown that except where high production techniques are used in agricultural production, returns are often too small to encourage farmers to produce for processors. Even with contractual farming there are problems emerging from the supply and demand conditions of the market. Because of this, consideration must be given to the establishment of producer-

processor enterprises. This system has proven to be successful in many parts of the world including the Caribbean. Establishment of producer-processor enterprises would counteract many of the constraints, such as, poor producer-processor relationship, unpredictable raw material supply and poor quality raw materials, etc., which are likely to retard the development of a food industry.

Prospective areas for development would include:

1. Nectars and Cordials: There are ready CARIFTA and North American markets for good quality tropical fruit nectars and cordials, such as sour-sop, sugar apple, golden apple, guava, mango, tamarind and sorrel. There is need to investigate the production of nectars and cordials from some of our lesser known tropical fruits.
2. Tropical Fruit Salad and Canned Fruits: We at the U.W.I. developed a fruit salad from grapefruit, pawpaw, banana and pineapples. This product had a very high acceptability with both West Indians and foreigners. A Trinidad processor test-marketed a few cases in North America and was swamped with orders which he could not fill because of a lack of raw material supply. Other products tested at U.W.I. were mango slices, guava shells and diced pawpaw; all had shelf-life of more than a year and high acceptability.
3. Jams, Jellies and Compote: Except for guava jelly and citrus marmalade little has been done in the way of jams and jellies from some of our lesser known tropical fruits. Professor Esselen (7) while on sabbatical in 1972 at U.W.I. carried out a preliminary survey of jelly and jam making with some of our lesser known tropical fruits such as dunks (*Zizyphus mauritiana*), Golden apple (*Spondias dulcis*), Hog plum (*Spondias mombin*) and Pomerac (*Eugenia malaccensis*) and got encouraging results. We may be able to create a specialised market for some of these exotic products.
4. Crystallized and Dried Fruits: Guyana has shown the way and I am told Jamaica fast following in the production of crystallized and dried fruits for cake and pastry making. There is a ready CARIFTA market, and with good promotion we may be able to establish a specialised limited market in North America and Europe.
5. Very little processing has been done with our tropical vegetables. We seem to have concentrated on the traditional types. At U.W.I. we have successfully canned bodi bean (immature pods of the cowpea) and at present are working on the canning and freezing of christophene or cho-cho (*Sechium edule*), and vegetable soybean.

We have said enough about fruits and vegetables to establish that the potential for processing exists. What is now required is careful planning and development. We believe that a regional market exists for canned and processed fruits and vegetables both among the native population and the tourist industry. We should attempt to set up small specialized export markets for high quality high priced products specially packed and presented.

Other Areas with Prospects for Development

The region imports \$11.4m. in sugar and sugar preparations. This is quite a large sum for the import of a product we ourselves produce. It should be possible for us to process some of the sugar products we import. There is need therefore for an investigation to determine the types of sugar and sugar products we import and the possibility of local production.

There is also a very large bill of \$12.8m. for extra-regional cocoa, coffee, tea and spices. Meat and meat products account for \$87.0m., the

second largest single item of food imported from outside the region. While it must be recognised that this expenditure represents fresh meat, mainly beef, a fair amount goes into processed meats. We may not be able to be self-sufficient in beef, because of the restrictions placed on Guyana, but we can be self-sufficient in pork and poultry, provided we are able to meet our animal feed requirements which amount to \$26.8m. The main inputs into animal feed are carbohydrate and protein which we import as soyabean and maize. We know attempts are being made to develop these crops but many problems remain unsolved. Probably we should look at unicellular protein production from carbohydrate substrates and, in Trinidad, from petroleum. Greater efforts should be put into the processing of legumes for their protein content as human food.

Consideration should be given to the development of small scale (community) processing of pork products such as ham, bacon and pickled meat, as well as the production of sausages. Little has been done in the processing of poultry, and attention should be given to the development of canned and smoked poultry meat and its attendant by-product soup stock.

Extra-regional import of fish and fish products amounts to \$43.0m. and this represents mainly salted and canned fish. We are yet to fully exploit the fishing banks off the South American coast. The reason for this is that we were unprepared; however, with the United Nations help we seem to be making progress slowly. Guyana, Trinidad and Tobago, Barbados and possibly Grenada are in a very favourable position to exploit these resources. At present they are being exploited by foreign nations far removed from the Caribbean.

There can be no doubt that there is tremendous scope for food processing development, even if we exclude the export potentials. At the present time the potential for high profit enterprises are limited; those that exist have already been taken over or are being negotiated. The marginal areas are left unattended. This *free for all grabbing game* will not solve our food problems. What is needed is a well thought-out all-embracing plan for food development in the region, the main objective being a high degree of self-sufficiency in food production, linked with social upliftment for the lower income section of our society. This means the redistribution of resources from the more lucrative areas to the less. If this is not done voluntarily, then I am afraid that in the not too distant future it is likely to be done forcibly. The resources for such a transformation exist. We possess a fair number of technically trained people, with enough material and financial resources; all we need is self-confidence, courage, loyalty and dedication.

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