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MEASURES TO IMPROVE THE COMPETITIVENESS OF THE SUGAR-CANE INDUSTRY IN AFRICA*

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* The views expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has not been edited.

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CONTENTS

INTRODUCTION

1. The First Interregional Consultation on the Food-processing Industry with Emphasis on Sugar-Cane Processing, held at Havana, Cuba, from 26 to 30 September 1988, analysed the existing situation of the sugar cane-processing industry, particularly in developing countries, and discussed the issue of diversification of all aspects, and the improvement in the productivity of the cane-sugar sector.

2. The Consultation called for expansion of the technical assistance programme in the following areas: technology of processing, management, quality of production, restructuring and rehabilitation of existing factories, diversification aspects, regional and interregional co-operation and the role of UNIDO, GEPLACEA and other organizations in the promotion of such co-operation.

3. Looking at the specific problems of the African cane-sugar producing countries, such as, for instance, low profits and economic instability, insufficient know-how, lack of market information, and low key market activities, it was proposed that UNIDO convene an expert group meeting to promote regional co-operation on technology and marketing, together with ideas for the establishment of an organizational framework for African cane-sugar producers.

4. Based on this proposal, an expert group meeting for the African region in promoting regional co-operation for the establishment of an organizational framework for sugar-cane producers and co-operation on technology and market was held in Vienna, Austria, from 5 to 8 June 1990.

5. The basic objective of the Expert Group Meeting of African Countries was to assist cane-sugar producing countries in developing a strategy to improving the viability and profitability of the sugar industry and to assist in starting a programme for the establishment of an organization for African countries. This regional organization would be a consultation, co-ordination and information body for cane-sugar producing countries in Africa on issues of common interest.

6. As part of the wide-range activities in the area of agro-industries and in preparation for a Regional Consultation, the Expert Group Meeting on Industrial Rehabilitation and Restructuring with Special Focus on the Food-processing Subsector in Africa was held in Vienna from 23 to 25 October 1989. The meeting focussed on the food-processing subsector because of its crucial significance for both agricultural and industrial development as well as its potential for contributing to food self-sufficiency and security in Africa.

7. Based on this preparatory work, the Regional Consultation on Industrial Rehabilitation/Restructuring with Special Focus on the Food-processing Subsector in Africa, was held in Vienna, from 12 to 16 November 1990. The Consultation meeting examined the approach to industrial rehabilitation at the enterprise level and the national policies and support activities for industrial restructuring, for the long-term profitability of food-processing in Africa.

8. It was recognized that the food-processing industries played an important role in the economic and social development of Africa and considered it essential for the implementation of rehabilitation and restructuring programmes and projects. Important was the design of policies and strategies and plans for rehabilitation.

9. As a follow-up to the above-mentioned Regional Consultation a Workshop is being organized to discuss the related issues of improving the competitiveness of African cane-sugar complexes to better face international competition.

10. The main objectives of the Workshop are:

(i) To devise a framework for a comprehensive approach to meeting the perceived needs of the sugar industry in Africa and identifying the possibilities for improving performance and profitability;

(ii) To recommend within that framework, specific proposals on action-oriented measures which will contribute to attain a competitive African sugar industry;

(iii) To define within that framework, an action programme for enhanced North-South and South-South co-operation, with special emphasis on intra-African trade, for the growth of this industry;

(iv) To make specific recommendations for financing the programme/activities recommended.

11. The Workshop will be convened 1992 in Africa.

12. Following the results of the Consultation a sectoral development programme was initiated for technical assistance in Africa. Within the framework of specific projects, assistance will be provided to selected sugar factories covering the following aspects: techniques and technology, maintenance of equipment, problem of raw materials, production, marketing and management techniques, and financial and economic assessment.

13. The aim of this paper is to list the crucial factors influencing the competitiveness of the cane-sugar industry. Any improvement related to these factors could have a positive effect on the viability of production, the access to the market as well as decreasing production costs.

14. The purpose of the discussion at the Workshop is to reach conclusions and make recommendations in connection with the main factors influencing governments, enterprises, international and regional institutions and organizations in their policies and strategies.

15. The main factors discussed in the paper are related to:

- the raw material supply and technology; factory rehabilitation;
- strategies for diversification and by-products;
- management, human resources and social implications;

- market;
- finance;
- international co-operation;
- constraints to development.

16. Some statistical tables as an Annex are included to assist the orientation of the participants at the Workshop.

1. Raw material supply and technological problems

17. A major contribution to the improvement of competitiveness in the sugar-cane industry in Africa could be the innovations in technology, the introduction of new methods, as well as the improvement of existing ones, and technology transfer.

18. The result of development in technology would be the decrease of production costs, improvement of productivity and increased profits from the agricultural and industrial sectors.

19. Another effect could be facilitating access to the market.

Potential of the agricultural sector to produce raw materials

20. Raw material quality, quantity and cost have a major and decisive effect on the overall economic viability of the sugar industry.

21. The cost of growing sugar cane and the price of the final products will determine a part of resources for technical and economic support for future strategies and plans for the industry.

22. The starting point for improvements in the agro-sector are the varieties of sugar cane, determining both the quality and the quantity of the production. The reason comes naturally from the fact that the costs for the growers are practically constant regardless to level of varieties involved.

23. To reduce the production costs and improve productivity it is imperative to use high-yield varieties. Beside this, the productivity of sugar cane results from a balanced interaction between certain basic factors like:

- agricultural process applied;
- management;
- control of pests, weeds and diseases.

24. In order to obtain suitable varieties, there is a need to evaluate the characteristics of every production area, to ascertain climatic and soil conditions, taking into account the overall plans and strategies for the operation.

25. The existence of a genetic improvement programme will contribute significantly to the efficiency of producing sugar alcohol and other derivatives with increased profit.

26. For genetic improvement of the different varieties, there are well-known technologies available, and furthermore sophisticated techniques like tissue culture and application of genetic engineering with potentials for the future are enormous. Of course there is a need for well-qualified staff to co-operate with the specialists in this field.

27. In this respect, regional and interregional co-operation play an essential role via the exchange of varieties and genetic material for the improvement activities. This calls for an improved quarantine service to look for diseases and reduce the potential entry of new pathogenic agents.

28. In the sugar exporting countries, sugar-cane production heavily affects the economics. Any change, therefore, will have a direct effect to the balance of payment, etc.

29. The industrialization of sugar-cane production, namely the introduction of mechanization into its growing and harvesting is one of the most important contributions to the cost of production.

30. For mechanizing the sugar cane growing there are three basic systems known as the Australian, Hawaiian and the Louisiana systems. For these systems, specialized machinery and technology, and specific varieties have been established.

31. The application of one of the systems is feasible when evaluation of local conditions related to the preparation of soil and available equipment suited to specific conditions, is made well in advance. Consideration must also be given to proper training and guidance for the technical and administrative personnel, management, etc.

32. However, experience has shown, that lack of consideration and adaptation prior to mechanization has an adverse effect - as in the case of some Latin American countries where they have not achieved their targets of reduced costs. The application of new technologies in any sugar-cane producing complex must be planned and carefully prepared, and put into effect gradually in accordance with previously established plans and timetables.

Technologies for processing

33. There is a need to follow closely the various stages in the processing of the cane from the point where it reaches the mill up to the final product obtained. This involves the cutting, collecting, transport and processing of the sugar cane. Special care should be paid to quality in terms of saccharose content. Nowadays increasing application of computerized programmes and control of operations has become one of the major conditions to ensuring high quality results of the process.

34. One should not neglect the importance of establishing a system of payment for the cane in relation to its quality which is determined by the saccharose content. This enable cane growers to deliver raw material under nearly optimal conditions.

35. The apparatus for measuring the saccharose content has been applied with incorporation of new technologies. These instruments are available on the market. Those mills where these measures are applied have shown good results.

36. As far as extraction of saccharose is concerned experience in many countries shows that it is advisable to use oscillating blade cutters and de-fibraters applying automated control of the mill feed.

37. Good results have been obtaining with the introduction of sugar-cane diffusers for better extraction with reduced power consumption and equipment preservation. Steam generation and distribution has undergone significant development, contributing to the more efficient use of boilers, saving more bagasse for other purposes. (See diversification.)

38. Without going into detail, mention should also be made of heat de-aeraters, driers, pre-heaters, replacement of old furnaces, installation of control devices of the extraction etc.

39. As a general rule, the mills should be self-sufficient in energy, even producing surplus amounts for transmission to the national network, thus generating an extra income.

40. Co-generating of electricity involves efficiency for the energy balance of the factory - and this involves replacement of former heaters by high pressure devices, better water treatment, and the substantive training of staff.

41. By the application of these integrated energy systems, increased efficiency of as much as 30 per cent could be reached.

42. The above-mentioned improvements require of course substantial investments; however, the profitability is significant and the results contribute to the economy of the entire operation.

43. New elements have been introduced concerning the purification of juice. Those include hydrocyclones for removing mineral impurities and static, vibrating and rotating strainers for removing particles of vegetation.

44. In the clarification process, use is made of calcium saccharate instead of calcium hydroxide to produce high grade juice, as well as the system for automatic pH control when clarifying the mixed juice, and in the refining procedure.

45. The flotation process applies to purification of molasses and removal of impurities.

46. To improve the quality of the saccharose crystals during the final stage of processing, innovations have been made for vertical pans with a "calandria" aimed at reducing the stagnation zones, thereby improving circulation.

47. Regarding the final operation, since the introduction of the faster automatic centrifuges (1500 rpm) there have been few innovations in the centrifuging operation except for the replacement of washing with water and steam, by washing with superheated water (110 Co) which reduces the cycle and temperature differential between the sugar remaining in the centrifuges for bagging and the temperature of the air.

48. The use of magnetic equipment to remove metallic particles from the sugar has also contributed to quality improvement.

49. Bulk sugar handling systems were introduced in packaging, storage and dispatch by which these operations have been made much more simple.

50. The incorporation of new technologies has also contributed to considerable improvement in process engineering.

51. Introduction of new equipment ensures continuity and stability in the process system contributing to reaching of targets in terms of cost, quality and quantity of the final products.

52. As far as quality control of the final product is concerned, efficient systems have been established relating to measurements of insoluble residues, black points and grain size. All these techniques for assisting export of sugar are based on the requirements of ICUMSA (International Commission for Uniform Methods of Sugar Analysis).

Modernization and factory rehabilitation

53. Due to present and possibly future market prices of sugar - both on the export and the local market - it is necessary that efficiency of the factories is increased and that losses and production costs are recuded. These objectives can be reached by the adoption of a well-planned and well-focused investment policy.

54. One of the main indicators used to assess factory efficiency is the Reduced Overall Recovery (ROR).

55. In the case of Mauritius, the average ROR 1984-89 was 85.3. The effort of factory rehabilitation and modernization is expected to bring the level of efficiency to ROR 86.5 which means an additional sugar production of about 9,000 tons.

56. Useful life of equipment and machinery as well as proper and efficient maintenance are closely linked together.

57. Skilled workers are not only useful for maintenance purposes they also reduce significantly installation costs.

58. In the case of Mauritius such costs represent 20 % of the c.i.f. value of equipment.

59. In some parts of Africa, where turnkey agreements with suppliers of equipment are the normal rule, installation costs represent around 50 % of the c.i.f. value. It is important, therefore, that when plans are being made for modernization and changes in technological processes account should be taken of installation costs. In addition, training of skilled maintenance workers should be an integral part of maintenance improvement strategies, and it is worth mentioning that training courses are to be implemented in the near future with wide participation of African countries

2. Strategies for diversification of production

60. Diversifying the sugar-cane agro-industry pre-supposes the preparation of a co-ordinated plan of action to change the traditional production activities of this sector. Thus entails production of the fullest range of consumer goods possible, apart from sugar; the result would be assured market and acceptable prices.

61. All decisions should be made jointly between State and the private sector - even if the industry is in private hands since State protection and support is indispensable.

62. Once a decision on diversification has been taken, an analysis should be undertaken on the best way to the implementation; the way in which it is to be carried out, i.e. what should be produced, how to produce it and with what resources, for what markets would the products be intended, when should diversification of production commence, and in how many stages would it be carried out.

63. The diversification of the traditional sugar industry must be regarded from two points of view: the agricultural and the industrial. The agricultural aspect is the increased productivity of the sugar-cane plantations which is of paramount importance for the profitability of the entire activity. This leads to the need for cultivating the most productive varieties of sugar cane in line with the objectives persued, and to the application of the most efficient cultivation methods so as to obtain a larger quantity of sugar cane from the area planted, or the same quantity from a smaller area, and to use part of such land, if possible, for other crops or purposes. It is necessary to promote the system of crop alternation or rotation in order to derive maximum benefit from the soil. These practices are being adopted with excellent results in a number of sugar-producing countries, many of which have devoted substantial resources to related research and development. The interchange of knowledge and experience by means of horizontal co-operation would therefore be of great value in this field.

64. The industrial diversification includes:

- alternative use of cane, such as for fuel alcohol or directly as animal feed;

- industrialization of by-products.

The by-product problems are discussed in details later on in this paper.

65. The First Interregional Consultation on the Food-processing Industry with Emphasis on Sugar-Cane Processing came up with a definition of the word diversification.

> "Diversification means the integral use of the sugar-cane plant, the optimization of the use of the by-products of the manufacture of sugar, and the use of sugar itself and of the sugar-cane plant as raw materials for transformation into other valuable products in terms of economy and social impact. It also means the optimum use of land under cane, for example, interline cultivation."

66. No single country in the world has been able to attain this ambitious target. Certain GEPLACEA Member States have gone a long way though. Brazil, for instance, uses the cane plant directly without having recourse to the production of sugar and the obtention of its by-products. The Cuban Institute for the development of by-products has conducted experiments on an impressive list of products.

67. The use of by-products in Africa is still at an early stage. It is therefore imperative to devise ways and means to increase the use of sugar by-products and some cases are given below where attempts have been made in that direction.

Malawi and Zimbabwe

68. Both these countries which have no oil resources, have gone a long way in the use of final molasses and even some "B" molasses for the production of ethanol which is used for blending with fuel. The extent of alcohol used is slowly being increased. Wider application for ethanol as fuel and diesel substitute is also being explored.

69. Use of bagasse is rather limited in these two countries. There are no paper or furfural plants in operation. Low cost hydro-electricity and cheap coal do not warrant heavy investment for the purpose of generating electricity from bagasse.

Mauritius

Bagasse

70. At present, some 110 kWH/t of sugar produced is generated and sold to the national grid. Electricity generated by burning bagasse accounts for 16 % of the total requirements of Mauritius. It is planned to increase this proportion to 30 % by 1995 and for this purpose the Government has designed a comprehensive and attractive incentive scheme.

71. One sugar factory has a dual purpose boiler which can use coal (imported) or bagasse as combustible and its share in the national production is around 15 %.

Interline cultivation

72. Land scarcity has prompted the Mauritian Government and the sugar industry to develop a rational policy whereby the acreage under cane is used in an optimal manner. Mauritius is, in this respect, considered to be a model country.

3. By-products and their markets

73. The sugar industry has, for many years, attempted to increase its earnings by marketing the two major by-products of the sugar-cane processing, namely bagasse and molasse.

74. Major derivatives that have until now been commercialized with success are paper and pulp, particle board and furfural from bagasse, alcohol, alco-chemicals, animal feed, rum, citric-acid, yeast, mono-sodium glutamate and some amino acids from molasses.

75. It should be mentioned that the international trade in molasses itself has made an important contribution to the profits from the sugar industry and the use of bagasse as an energy source made a significant reduction in the production costs of the industry.

76. As far as the commercialization of sugar by-products is concerned, a lot of ventures appear to have been unsuccessful. The reasons are inter alia, bad planning, unrealistic feasibility studies, management failures, and neglecting of market situations.

77. It is always important to have a large enough domestic or regional market for a factory to be independent. To develop a facility that depends solely on export markets rarely works.

Below is a list of major sugar by-products.

Bagasse

The average composition of the whole bagasse is as follows:

Physical analysis (mill run)	
Moisture	50 %
Fibre	48 %
Soluble solids	2 %

Chemical analysis (dry basis)	
Cellulose	45 %
Pentosans	26 %
Lignin	21 %
Ash	3 %
Other organics	5 %

78. The fibrous part is the main ingredient for particle board and fibre board, cellulose is the basis for pulp and paper.

79. The pentosans lead to furfural and other furan derivatives, lignin is mainly used as combustible.

80. The net calorific value of mill-run bagasse is 7574 KJ/kg, while the bone dry bagasse would be 17660 kJ/kg.

Pulp and paper

81. The technology for processing pulp and paper from bagasse has progressed continously. To date there are about 120 operating plants producing pulp and paper. 64 plants produce 2.4 millions tons of pulp and 20 plants produce 1 million tons of notepaper yearly. The international paper trade is sceptical about bagasse newsprint as an international traded commodity on account of its tendency to tear on high-speed printing machines.

82. In general bagasse-based papers have been used in the country where they are produced, and have not yet been able to make a serious impact on export markets.

83. The estimated cost of production of bagasse bleach slush pulp (Kraft process) is about 378 US$ per ton of pulp.

Resin board

84. There are about 30 plants in operation world-wide with a total annual capacity of 625 000 tons.

85. The investment cost for a particle board plant with an annual capacity of 50.000 m3 is about US$ 15 million. The production cost is about US$ 200 per ton of board and, the expected market price is US$ 250-290 /tons according to local conditions.

86. The main problem with particle board is that its use is limited as it loses strength when exposed to a moist atmosphere. However, it is a good material for furniture, interior partitioning and cabinets.

87. Todate, many studies have exaggerated the export potential. However there is a real need for low cost homes and cheap furniture and careful analysis would be required before undertaking an operation in this field.

Furfural

88. For bagasse the practical yield to be expected is 9.6 % by weight on a dry basis. The investment cost for a furfural plant of 5000 tons annual capacity is about US$ 15 millions. Production costs taking into account average conditions would be approximately US$ 900 /ton of furfural.

89. There is overcapacity of production in world markets and demand can easily be met from existing capacities.

Molasses

90. The yearly production of molasses (both beat and cane molasses) is about 40 million tons. The export trade for this commodity has reached the 6 million ton level.

91. For the rest of the world excluding Brasil some 70 % of the molasses available is utilized as an ingredient in animal feed. In this respect, 6.5 gallons of molasses are equivalent in carbohydrate value to 1 bushel of corn (i.e. approx. 35 kg of molasses = 25 kg of corn). The yield of molasses is about 3 % per ton of cane and, its specific gravity about 1.43.

92. The average selling price of molasses in early 1991-basis 79.5 Brix per metric ton FOB New Orleans was US$ 74.

93. A large number of products can be derived from molasses. Figure 1 illustrates those that are of economic importance on an industrial scale.

Animal feed

94. The value of molasses as an animal feed is well known. Its utilization 1990 in Europe was some 4 million of tons and in the USA about 1.6 million tons.

95. The most important element of cane molasses as an animal feed is its high content of carbohydrates, mainly sugars. A great advantage is its palatability, which induces animals to eat roughage of poor quality. It improves pelletization, and can serve as a transfer for urea and phosphoric acid in liquid feeds.

96. The nutritive value of cane molasses as compared with oats and maize could be found in Table 1.

97. A mixture of molasses with a fibrous carrier - generally bagasse pith - has been widely used as animal feed by every cane-sugar producing country. About 75 % by weight of molasses was mixed with about 25 % of dried bagasse pith with the addition of urea, soya meal or groundnut cake.

98. Alot of research work has been done in this field, with case studies in Zimbabwe, Colombia, Mauritius, the Philippines etc., the results of which have been published by FAO - and many other countries.

99. According to a calculation made by J.M. Paturau in 1991,if the price of molasses is US$ 40 /metric ton and dried bagasse pith is US$ 10 /metric ton, a break-even price for meat (carcasse weight) would have to be US$ 1.58/kg.

Ethanol

100. Ethanol (ethyl alcohol) is among the most important by-products of molasses. It is also produced synthetically.

101. About 240 litres of ethanol (at 100 GL basis) can be obtained from one ton of medium quality cane molasses.

102. Ethanol is generally produced in three main grades:

a) Industrial alcohol (96.5 GL) used as solvent, fuel and feedstock and for many chemical products;

b) Fine alcohol (96.0 GL) used mainly for pharmaceuticals, cosmetics and for human consumption;

c) Absolute or anhydrous alcohol (99.7 GL) a water-free ethyl alcohol used in pharmaceuticals, intermediates and for internal combustion engines, mixed with 80-85 % of gazoline.

103. The cost of production depends on the price of molasses or cane juice, as follows:

Molasses at US$	75/ton,	cost of ethanol	45	cts/litre
"	50/ton,	"	36	"
"	25/ton,	"	27	"
Cane juice US$	20/ton	cost of ethanol	48	cts/litre
"	15/ton	"	41	"
"	10/ton	"	34	"

The scale of operation also influences the cost of production.

104. In the biennium 1990-1991, Brasil, the world leader in ethanol production, produced 11.798 billion litres. Other sugar producing countries have become interested in ethanol production but in many cases the local conditions are not as favourable. The relatively high cost of production compared to gasoline is a serious constraint.

105. Figure 2 illustrates price equivalence for alcohol and gasoline.

Figure 1: Main derivatives from molasses

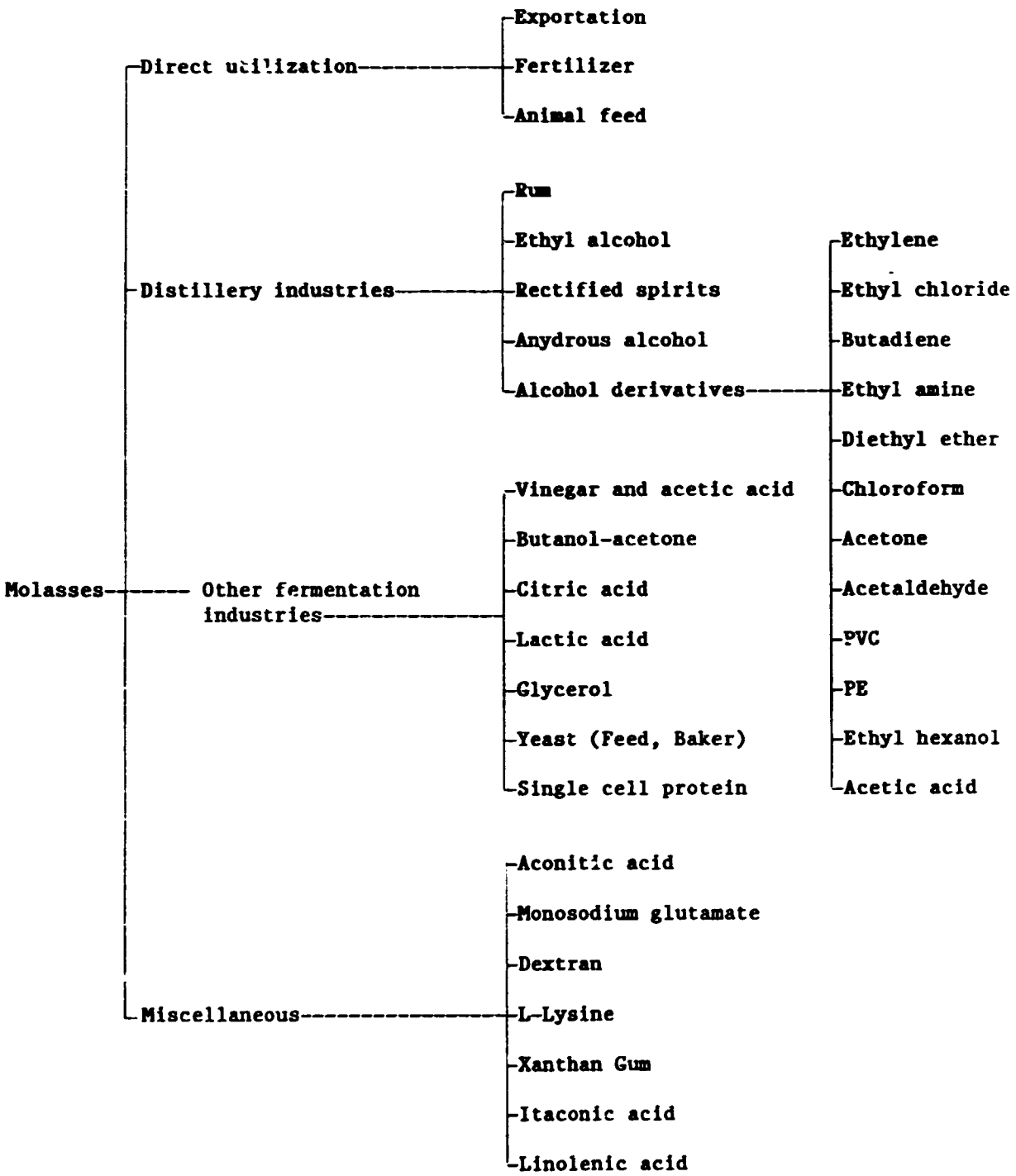


Table 1: Comparative nutritional value of cane molasses, oats and maize

Items %	Cane molasses	Oats	Maize
Carbohydrates	58	58.6	69.2
Water	20	10	15
Crude Protein	3.5	11.6	8.7
Fibre	-	12.0	2.0
Mineral Matter	10.5	4.3	1.2
Calcium (c)	0.8	0.09	0.02
Phosphorous (P)	0.10	0.33	0.27
Total Dry Matter	80	90	85
Total disgestible nutrients (TDN)	57	68.5	80
Digestible Protein	1.2	9.0	6.7
VITAMINS (mg/kg)			
Carotene	-	0.1	2.6
Thiamine	0.8	5.6	3.4
Riboflavin	3.0	1.0	1.0
Niacin	28.0	12.6	19.6
Panthotenic Acid	35.0	12.0	4.8

106. A number of chemicals can be produced from ethanol, such as acetaldehyde, acetic acid, butanol, ethylene glycol. The main problem however, is that they are bulk petrochemical products and at present prices the petrochemical industry can produce them in large quantities at lower prices. At the present level of oil prices, agro-based raw materials do not have sufficient margins to compensate for these higher costs: oil prices should be between US$ 30-35 per barrel to make the production of alcohol from agro-raw materials commercially viable. Unless the local market can absorb a level of demand equal to the break-even level of production, development should be considered very carefully.

Rum

107. From 1 ton of molasses 600 litres of rum (40 GL) can be obtained, from 1 ton of cane juice 180 litres of rum.

108. The annual consumption of rum in the USA as well as in the countries of the EEC is 120 million litres. Approximately 80 million litres of rum is imported in the EEC countries.

Citric acid

109. Citric acid is the industrial organic acids most widely used in the food and beverage industries. No synthetic citric acid has yet appeared as a potential competitor. The production of fermentation citric acid appears important in the larger cane-producing countries where molasses is available at competitive price and where the local market for beverages, confectionary etc. are on the increase.

110. World consumption of citric acid has reached the 450.000 ton level, with an installed capacity of about 650.000 tons/year. Its selling price in 1989 was US$ 1.80/kg. There are some problems associated with citric acid production. The know-how to produce in a viable way is held by a limited number of companies, usually those with international connections, interested in keeping their market viable. Therefore, these companies prefer joint ventures with a potentially promising market. This creates difficulties to obtaining the technology. There are also difficulties in operating the plants.

111. The world consumption is growing at between 3 and 8 percent/year so there will always be a possibility to consider a joint venture with an established producer.

Yeast and Single Cell Protein (SCP)

112. Two strains are mainly used, namely: saccharomyces cerevisiae to produce baker's yeast and torula utilis to produce feed yeast.

113. 4 kg of molasses is required to produce 1 kg of active dry baker's yeast (92 % dry matter) and the same quantity is needed to produce 1 kg of feed yeast (92 % d.m.).

114. The capital cost of feed yeast plant would be about US$ 1,000 per ton per year.

115. The production of SCP could be considered as a natural extension of feed yeast production. There is a favourable commercial outlook for animal feed which has reached a commercial stage. For human consumption the problem is more complex, in view of clinical trials, separation of nucleic acid, etc.

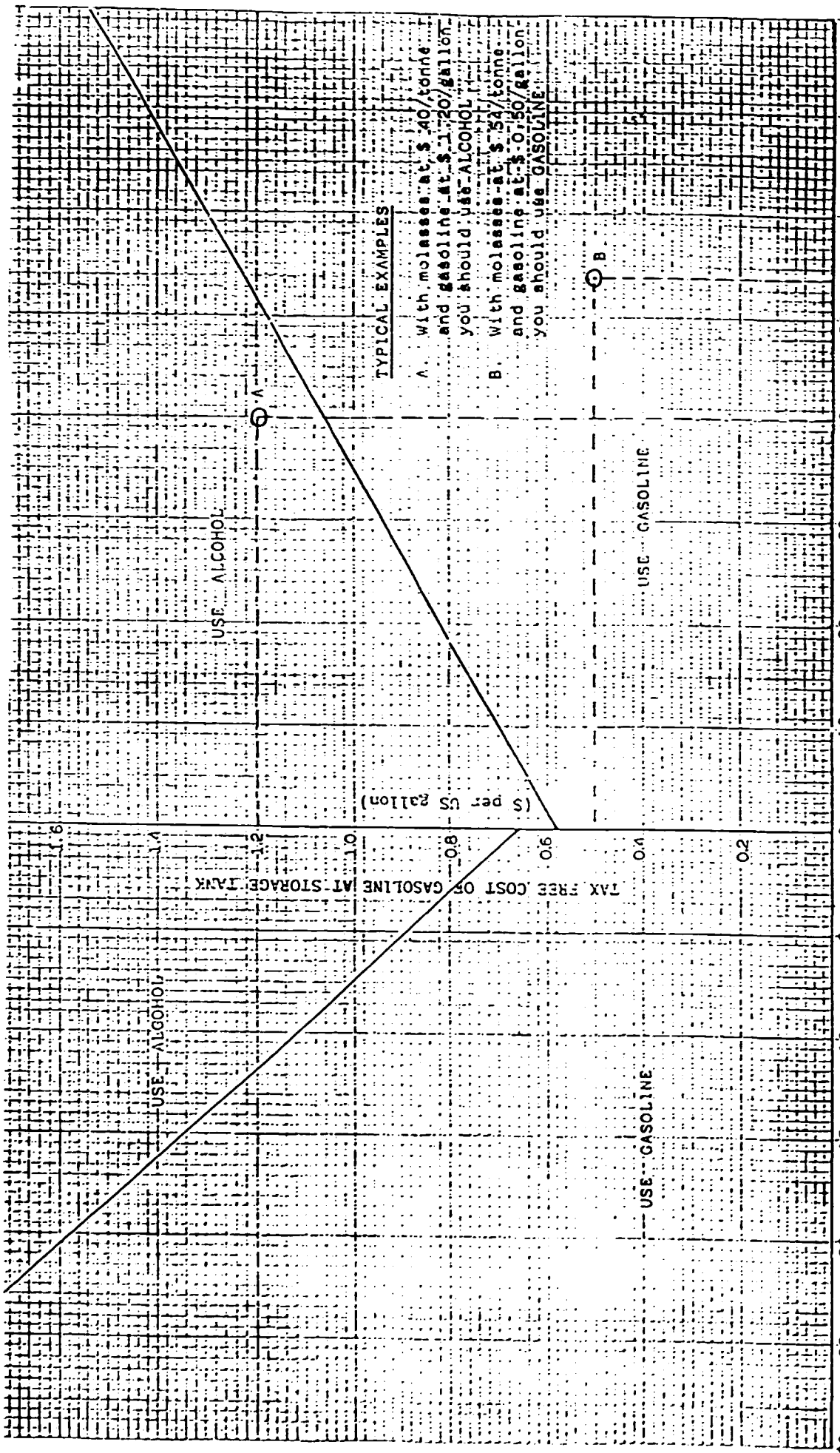


Figure 2: Price equivalence line for alcohol and gasoline

116. According to Mexican sources, the capital cost of an SCP plant is about US$ 2,200 per year/ton. The market price of SCP is now about US$ 1,200/ton.

117. It should be noted that Torula's lysin content is lower than fish meal and that production costs under present circumstances are the same. The production of Torula is not commercially viable unless the price of molasses falls sharply and that of other protein meals rises.

118. The main factor to producing baker's yeast at competitive prices is the low cost surplus energy in sugar factories.

Monosodium glutamate (MSG)

119. The main manufacturing process is aerobic fermentation with molasses and micrococus glutamicus. About 4.5 kg of molasses are required to produce 1 kg of MSG. Out of approximately 30 companies producing MSG world-wide, Ajinomoto is the largest. World production is about 300,000 tons and the installed capacity is around 336,000 tons. The Capital investment for a plant with 6,000 tons/year capacity is about US$ 18 million, and production costs are about US$ 1,800/ton. The market price in 1989 was US$ 1,900.

120. According to a report by WHO (1988), MSG is of low toxicity and at the usual dietary intake does not represent any health hazard.

121. The world market for MSG is controlled by a small number of Asian companies in Japan and the Republic of Korea. The marketing policies of the producers are directed towards a supply equal to demand to keep the price at a reasonable level.

Electricity from bagasse

122. The best solution to utilize the bagasse is to produce electricity via a high pressure boiler and turbo alternator. This has been found favourable in a large number of cane-producing countries. Using modern equipment, some 450 KwH per ton of mill-run bagasse can now be produced . One example of the calculation is given in Table 2.

123. If mill-run bagasse is priced at US$ 15 per ton, electricity can be generated throughou the year at a cost of approximately US cents 6 per KwH, which proves competitive with the price of electricity in most developing countries (1986 figures).

124. To operate economically, the generating station should work continuously and at least 7,800 hours yearly. This will allow bagasse storage that can be generated during the intercrop period. To reach this goal, various methods are available - dry and wet bulk storage, bale storage and pelletization.

125. Bale storage is currently the most widely-used method. It requires a substantial storage area but can lead to annual losses of about 10 per cent of the bagasse stored.

126. The generation of electricity from surplus bagasse is the easiest and best way to utilize of this by-product for most cane-producing developing countries.

Some final conclusions

127. It is useful to evaluate the profits that can be obtained from the utilization of bagasse and molasses. The basis for this calculation is a raw cane-sugar factory with a daily capacity of 5,000 tons of cane and a crop of 130 working days.

128. Out of a total bagasse production of 182,000 tons, 91,000 tons of wet bagasse will be available as surplus with 19,500 tons of molasses. If bagasse and molasses were sold as such at US$ 10 per ton and US$ 40 per ton respectively, the net revenue would be :

(a) US$ 910,000 for surplus bagasse; and
(b) US$ 780,000 for molasses.

The total annual profit would therefore amount to US$ 1,690,000.

129. By transforming the bagasse and molasses, the situation will be changed as follows.

130. Transformation of bagasse for electricity, paper, pulp, particle board and furfural - molasses for animal feed, ethanol, rum, citric acid, SCP and MSG.

131. Figure 3 is a summary of the results and shows a better return with animal feed, SCP and particle board.

132. In an enterprise combining the production of animal feed and particle board, the profit would be US$ 4,116,286 per crop. This would be the best choice for selection. Each country would analyse its specific situation, taking into account the local conditions before reaching a final decision.

4. Management, human resources, social implication

Management aspects

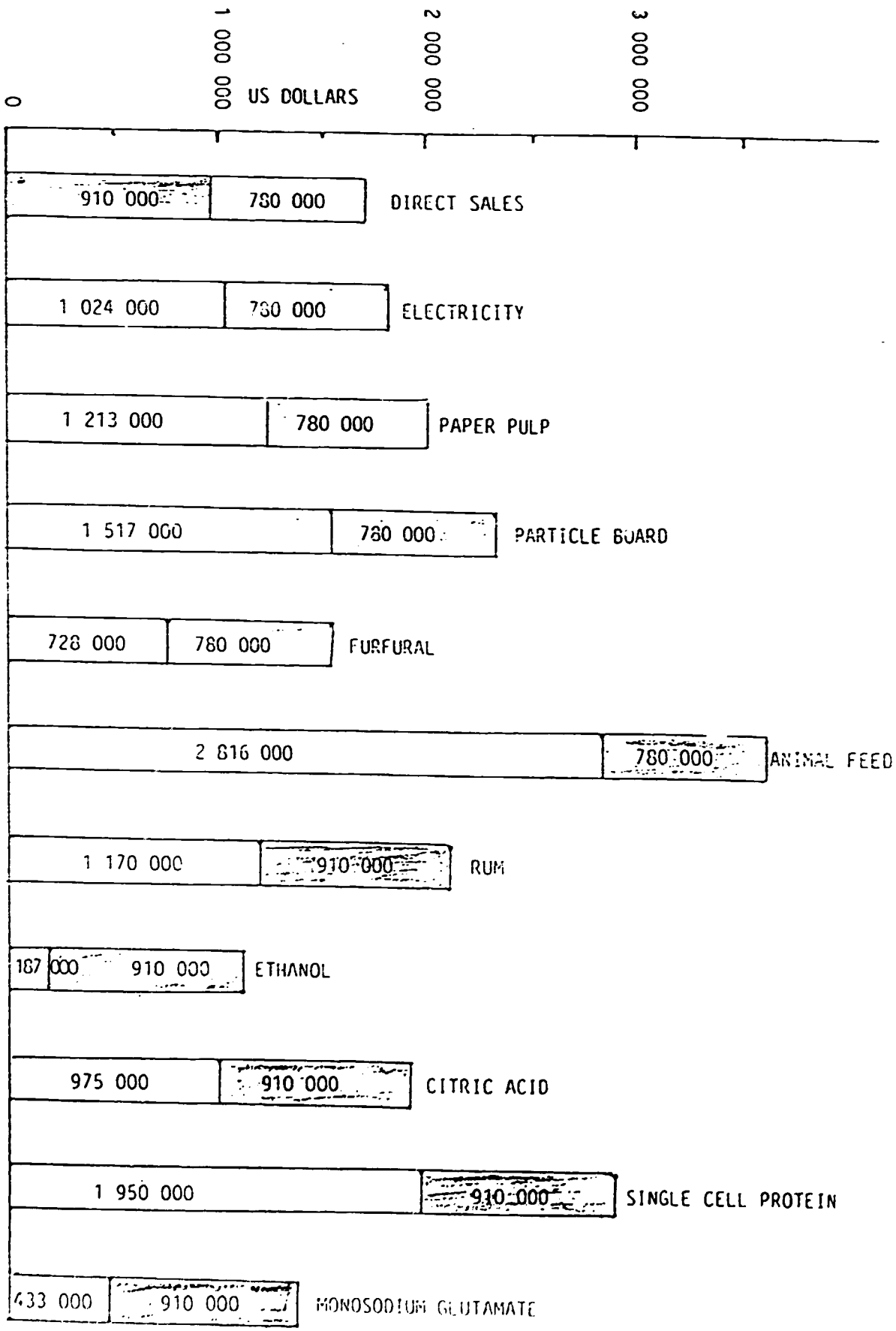
133. Restructuring the sugar-cane industry involves a series of administrative and functional changes whose social, political and economic effects must be foreseen when planning the development of the sugar industry. In fact, when changing the orientation of the sector and existing production patterns, special problems related to modernizing, installation, and processes emerge in the enterprises; this entails redeploying equipment and staff, eliminating existing production units or establishing new ones.

134. The optimization of processes requires the training and redeployment of various categories of workers. This combined with the possible need to close plants that are no longer profitable owing to their obsolescence and inefficiency, leads to job losses and thus generates unemployment for a number of persons who would have difficulty in finding work in the same sector. It is therefore important to plan the new cane-sugar agro-industry according to government guidelines, taking into account the micro-economic environment, which facilitates the solution of such problems. In most of the sugar producing countries, there are public or semi-public agencies that are officially and formally in charge of policy for the sector; their direct participation in the planning activities mentioned above is a decisive factor.

Table 2: Electricity from Bagasse

	Best conditions	Moderate conditions
1. Characteristics		
- Boiler (46 Bar A, 440°C) capacity tonnes steam per hour	90	90
- Turbo-alternator (condensing at 0.10 Bar A) capacity (MW)	20	20
- Total capital investment for generating station in working order (US$ million)	9	11
- Electricity generated yearly (GWh)	150	120
- Weight of mill-run bagasse utilized (tonnes)	333 000	266 000
- Acquisition cost of mill-run bagasse (US$ per tonne)	15	20
- Average transport cost per tonne of bagasse (US$)	4	5
2. Cost of electricity generated (in US$ cents per kWh)		
- Depreciation and maintenance (10%)	0.60	0.92
- Annuity repayment (0.16275 for 10 years at 10% interest)	0.98	1.49
- Labour and administration (US$ 100 000 yearly)	0.07	0.08
- Transport cost of bagasse	0.89	1.11
- Acquisition cost of bagasse	3.33	4.48
TOTAL GENERATION COST PER kWh	5.87	8.08
	say US cents 6.00/kWh	say US cents 8.00/kWh

Figure 3: **Comparative return of some by-products**



Improving the quality of human resources

135. Transferring new technologies or introducing, adapting and putting into practice more modern and effective systems and methods to improve efficiency in the sugar-cane agro-industry processes is one of the most difficult tasks to perform, compared with other production sectors, because of the traditional nature of that activity in the developing countries and the relative scarcity of professionals, technical experts and skilled labour as a whole.

136. For this reason it is essential, apart from undertaking a programme of instruction and training for the different classes of worker so as to ensure the smooth operation of the enterprise as a whole and optimum utilization of equipment and facilities, to see that when acquiring new technologies they should include as far as possible the installation, start-up and operation for a set period by specialized staff from the suppliers and, at the same time, to train local personnel in these areas and provide the technical assistance needed for the whole unit to function efficiently once the modified older structures have been integrated with the modern, newly installed ones.

137. The need to improve the quality of human resources is one of the fields in which South-South and North-South co-operation could be useful through exchange of knowledge, valuable aid in the industrial development and growth of the economy of developing countries which are seeking to improve their socio-economic conditions.

Social implications

138. In each African country the setting-up of sugar industries has been considered a key factor for rural area development and an important investment against rural exodus.

139. An average size sugar production unit employs some 3,000 permanent and seasonal workers on average and affects directly and indirectly about 30,000 people.

140. The units are usually set up in isolated areas and have stimulated the development of social and economic infrastructure: roads, schools, hospitals etc.

141. Of course the costs of the social factor influences the production costs. On the other hand the close link between the sugar plant and the development of the rural area has serious consequences for the population if a sugar plant collapses.

5. The international market situation from the point of view of African countries

142. The improvement of the viability and profitability of the sugar industry can be achieved through increased production created by additional market opportunities and significant reduction of operational and capital expenditure.

European Economic Community (EEC)

143. The sale of sugar to this market by a non-member State is virtually impossible.

144. About 1.3 million tons of sugar per year are allowed from certain members of the ACP group.

145. The agreement provides for guaranteed prices and access. Since the time of the original agreement, the membership of the EEC has been enlarged with three countries - Greece, Spain and Portugal, which are sugar-deficit countries. However, the EEC stated that the quantities agreed to earlier are unalterable.

146. This statement is clear and no extra sales of sugar could be expected to be made to the EEC, except from Portugal.

Portugal

147. The country is of important interest to African countries, purchasing about 300,000 tons of raw cane-sugar which are then processed in its three refineries.

148. It has been proved that beat cannot be grown in Portugal, domestic cane-sugar production is decreasing.

149. A joint ACP/EEC declaration was worked out dealing with the possibilities of access to the Portugese market.

150. African countries such as Swaziland, Malawi, Côte d'Ivoire and Zimbabwe obtained some concessions regarding the entry of 75,000 tons of sugar to Portugal, valued at world market prices upon payment of a levy.

151. It can be reasonably expected that this market will be opened in 1991 to ACP countries capable of supplying raw cane-sugar to the refineries.

The US market

152. The USA has never been a traditional market for African countries. Nevertheless, a limited number of African countries have been granted access to this market.

153. The system provides for a quota, and the amount of sugar supplied from Africa is about 9 per cent of the total quota.

154. The market has decreased in the recent years from 2.7 million tons in 1983 down to 957,100 tons in 1988 (MTRV). The reasons were the use of sweeteners, rise in domestic production, etc.

155. A reasonable forecast is that the new quota will provide some 1,250,000 MTRV of sugar with some country allocation system as before.

Eastern Europe

156. Eastern Europe is the third remunerative preferential market. Notwithstanding, no provision exists for the import of sugar from Africa.

157. Recent developments in that part of the world may even lead to an end of the existing preferential trade agreements leading to a new situation which could create changes.

6. Market prospects in Africa

158. It is necessary to intially look at the consumption level in Africa in comparison with the other parts of the world.

159. The average per capita consumption in Africa is lower than the world average. The next table indicates the consumption of centrifugal sugar for the major regions.

Region	Average consumption in 1989 kg sugar/capita/year
Europe	42,4
USA	31,2
Central America	46,7
Latin America	41,5
Africa	13,2
Asia*/	11,7
Oceania	43,3
World	20,9

*/ Traditional sugar not included.

Source: Sugar Yearbook 1989, ISO.

160. Within Africa, the consumption regionwise is as follows:

Region	Average consumption years 1984-1988 kg sugar/capita/year
Mauritius/Reunion	38
South Africa	38
Southern Africa	20
East Africa	< 10
Sudan	24
Egypt	34
North Africa	around 30
West and Cental Africa	< 10

Source: F.O. Licht

161. The regions where major developments could take place are East, West and Central Africa.

162. A 5 kg per capita increase in this region, taking into account the population growth, would create an additional requirement of 2.3 million tons of sugar.

163. As it can be seen from the regional situation, the African continent is heterogeneous. Evaluating the regions one by one, the situation is as follows:

Reunion and Mauritius

164. These two islands represent some 13 per cent of the production in Africa. More than 80 per cent of the sugar produced is exported to the EEC. Consumption has remained stable during last decade. Regarding the supply to other African countries, the islands are not expected to make a major contribution.

South Africa

165. The country represents some 27 per cent of the sugar production in Africa. Consumption is fairly high and has remained stable. Export of sugar is mainly directed towards the Far East. There is a tremendous potential for expansion of the production.

Southern Africa (Malawi, Swaziland, Zambia, Zimbabwe)

166. The region's production represents 17 per cent. The region is a net exporter to the USA and the EEC. Annual per capita consumption could be increased from 20 kg to 30 kg.

167. Agricultural conditions are suitable for cane production. There is scope for increased production.

East Africa

168. 10 per cent of Africa's production comes from the region which accounts for about 11 per cent of the continent's consumption.

169. The region is a net importer. Increased production would be used mainly to meet increased demand.

Sudan

170. Ambitious plans were established in the mid-seventies. Sudan was expected to become the major supplier of Egypt and the Middle East. Production was however delayed and rehabilitation of the industry started in the eighties. Production has steadily increased over the last decade.

171. The deficit countries need some 1.5 million tons of sugar per year.

Egypt

172. The country is the most important consumer and importer in Africa. It is also the second largest cane-sugar producer on the continent.

173. During the last decade, production increased in line with increased consumption. The country will remain a net importer of sugar.

North Africa

174. With the exception of Morocco, the other countries of the region are non-sugar producers. Morocco has made considerable progress in the cane production.

West and Central Africa

175. The agronomic conditions are good for large-scale cane production, but it has not yet been implemented. The countries of these regions were not able to devote enough attention or resources to cane-sugar production. Water shortage problems hinder the production in the Sahel zone. There are a few exporters such as Côte d'Ivoire and Congo.

Prospects for intra-African sugar trade

176. African countries have little to expect from extra market share in the case of the remunerative international markets (USA, EEC). It seems, therefore, that the export of sugar to the free market is the alternative.

177. Profitable operations, taking into account the price environment, are possible for a few countries with very low production costs.

178. It is reasonable to envisage that expansion of production of the sugar industry in Africa could develop by: (a) upgrading the self-sufficiency level; and (b) developing intra-African trade.

179. The major element in African sugar trade is the distinction between the categories of sugar imported and exported. Seventy-five per cent of the imports are white sugar at EEC grade II; the remainder is mostly raw sugar. Ninety-five per cent of the raw sugar imported is directed to sugar refineries. Consumer preference in the main importing countries is EEC grade II of white sugar.

180. On the export side, EEC grade II white sugar only amounts to 10 per cent of total exports; two thirds of these come from South and Southern Africa.

181. Ensuring that African requirements are met by African supplies is really the most formidable challenge which the continent will have to face in the sugar industry. This objective can only be achieved with the full co-operation of all African countries. Resources are scarce in Africa; therefore their use should be strategically planned, taking into account all elements, such as prices, supplies, capacity utilization, investment financing, and export-import relations.

7. Cane-sugar competition on the world market

182. In the last 25 years, the cane-sugar industry world-wide has not progressed at the rate the beet-sugar has. Notwithstanding that the beet-sugar factory operates with the difficulty of providing external fuel to power its processes, its thermal efficiency has been better than the best cane-sugar factory - of the order of 0.98 GJ per tonne of beet in the first case against 1.50 GJ per ton of cane in the second.

183. For the cane-sugar industry therefore, it is a conditio sine qua non to increase its efficiency.

184. Figures 4 and 5 compare beet-sugar with cane-sugar. In this comparison beet sugar industry is represented by France and the cane-sugar industry by India and Mauritius. The figures give a fair picture of the results of comparison.

Figure 4: Average capacity of factories
(tonnes/day)

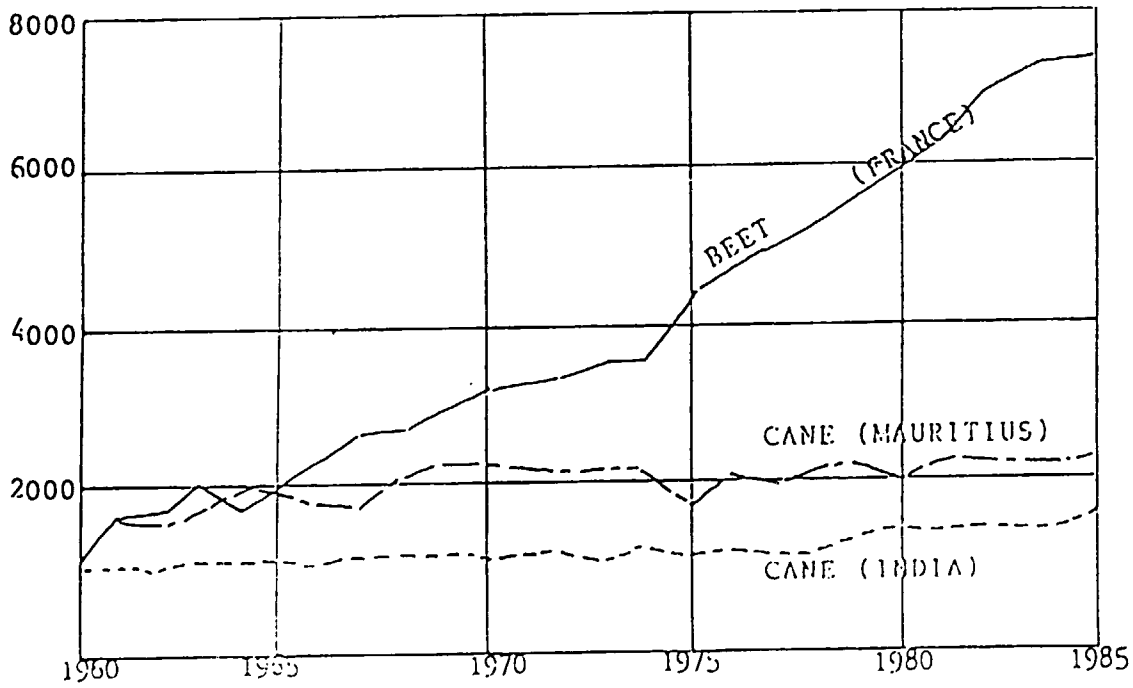
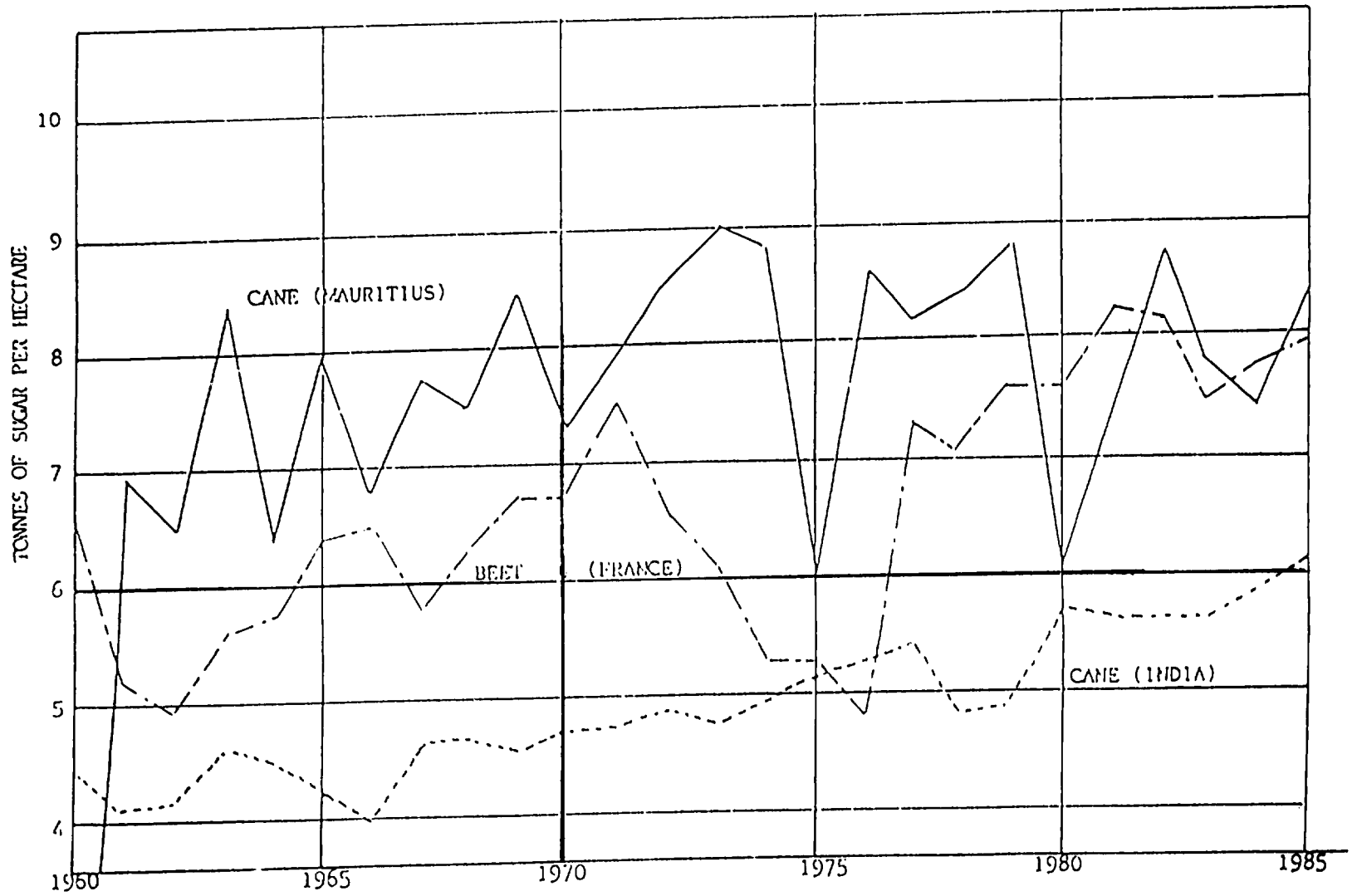


Figure 5: Sugar produced per hectare



8. Finance

185. The availability of financial resources is one of the most pressing problems of the African countries. Their capacity for generating capital to satisfy the most urgent domestic needs is being progressively diminished by the decline in international prices for their traditional export products - mostly raw materials of agricultural origin - and is further weakened by the rise in the prices of the imports that they need for subsistence. If we add to this the impossibility of using normal financing sources because of the magnitude of their external debt with international banks and with some developed countries, we can see that there is a major problem that can be solved only by concerted dialogue with the object of achieving negotiated agreements between the parties.

186. It is worth pointing out that the problem also arises in the case of interregional or international financing agencies. Apart from being heavily indebted to those institutions, the countries receive financial assistance with strings which are required to meet special conditions not always acceptable for them from socio-economic points of views.

187. However, as it is necessary to have recourse to international financial institutions, the most appropriate ways must be sought for concluding agreements that enable the countries to obtain funds from these sources without having to take internal action that would create socio-economic problems.

188. An interesting alternative for the cane-sugar agro-industry in the producer countries could be the execution of diversification projects on the basis of mixed government and private sector financing, where these sectors have appropriate resources for the purpose. Other variants would be an association between national and foreign capital through the joint venture system or an attempt to attract foreign investment and channel it to the cane-sugar agro-industrial sector by creating special incentives that would guarantee the safety and profitability of the investments.

189. A very important aspect is the involvement of the African Development Bank into the strategical plans for the development of the sugar-cane industry.

190. The purchase of new technologies able to help improve productivity in the sugar-cane-processing sector with all that is needed for their transfer and application is one of the principal obstacles facing the developing countries in planning balanced growth of their economies, since the normal credit systems, both domestic and foreign, often assign greater priority to the traditionally more cost-effective sectors. Hence it is the responsibility of governments and international organizations to bring about changes in the selection criteria for sectors entitled to credit and to include as soon as possible the sugar-cane agro-industry in the order of priorities to be considered with a view to supporting its development needs adequately.

191. Another important source of resources is the private enterprise sector which by means of investments, either independently or in conjunction with the State sector or with foreign companies, can encourage sugar agro-industry activities; this calls for State incentives to guarantee the effectiveness of the investments as well as their profitability. Of particular value is the system of domestic and foreign co-investment with firms in the same line that

could promote and facilitate the transfer and application of new technologies able to optimize processes, diversify production, reduce costs and improve the quality and presentation of products, thereby improving opportunities for access to new markets and gaining more remunerative prices.

192. For their part, international organizations could assist governments in the task of promoting interregional as well as multinational investment among the sugar-growing developing countries, at the same time as exploring the possibilities of funds from international institutions for specific projects which they themselves could help prepare or evaluate in those countries, guiding them and facilitating their access to such sources.

193. A determining factor in any of the alternatives planned for obtaining financial resources is the political will of governments of countries involved in world-wide problems, both in the northern and southern hemispheres, since it is vital to join forces to ensure complementarity and to achieve the objectives of economic development, social peace and stability.

9. International co-operation

194. International co-operation plays an important part by encouraging and supporting activities and programmes on an international, interregional, regional and national scale as well as by the negotiation of specific agreements on co-operation and technological exchange both vertically and horizontally, by means of which developing countries would receive technical and financial assistance for the introduction of new technologies and be given specialized advice on strengthening the local technical and administrative personnel for the selection of the most suitable of the given alternatives, as well as for more effective implementation of them on the basis of experience gained by other countries.

195. Co-operation should be carried out at different levels: at the intraregional and interregional, between developing sugar-producing countries in which the evolution on the sugar-cane agro-industry has been different enough to allow complementarity between them and the combination of forces and resources for common aims of regional interest. At international level the developed countries could, either through the international and regional specialized organizations or in direct form lend specific support for the technological development of the sugar industry in the less favoured countries, more especially the companies in those countries manufacturing machinery, equipment and instruments, with due regard for the fact that this would mean expension of their markets, which would be to their own benefit.

196. Nevertheless, emphasis should be placed on the importance of exchange of technology, knowledge and experience between developing countries in the same region and with other similar regions, for example between the countries of Latin America, the Carribean, Asia, the Pacific and Africa, which have for different reasons reached differing degrees of development in their economies, industries and technological advancement. In this respect two special areas of co-operation should be mentioned - the African sugar trade, and the crucial aspects of sugar production and equipment procurement.

197. To improve the African sugar trade, the following is proposed:

- An organization dealing with the marketing of sugar should be organized, by UNIDO along the lines of "GEPLACEA" for the Latin American countries. The object of this organization would be:

  a) to provide information on the opportunities of African sugar trade;

  b) to discuss all the consequences and practical difficulties resulting from a change in the existing trade flows; and to find solutions whether economic or otherwise;

  c) sugar-producing associations should agree on a development strategy;

  d) to promote and monitor inter-African trade.

198. Relating to the question of procurement of equipment, the following should be mentioned: it is vital for the African sugar industry to obtain equipment for sugar production and by-product use at relatively low prices.

199. Many GEPLACEA countries are low cost manufacturers of equipment. It is therefore advisable that African and GEPLACEA countries identify the needs of the African sugar producing countries, and find solutions which would reduce capital costs in Africa. This examination could be carried out under the aegis of the UNIDO.

10. Constraints to development

200. In order to develop strategies for the future, it is necessary to identify the constraints with which the African sugar industry is currently faced.

Absence of market

201. The share of remunerative preferential markets has decreased over the last few years and inter-African trade is currently limited. On the other hand, the major exporters on the free market are more competitive than most of the African countries.

Lack of appropriate institutions

202. Yields and production depend on the stable and high quality supply of raw materials which can be met in countries where well-established research institutes and extension services exist. There is, however, a lack of such institutions in Africa, particularly in the new sugar-producing countries.

Lack of proper control and maintenance

203. Process control is essential for proper recovery of sugar at the factory level. The maintenance of equipment is also a basic factor. Poor maintenance creates an escalation of costs, the result of which is high maintenance and operational expenses requiring subsidies from the scarce resources of the countries.

204. To overcome these difficulties, some institutions are already proposing measures: CEPLACEA has published a handbook entitled "Methodology for technical analysis of the equipment of the sugar industry", and the Regional Sugar-Cane Training Centre for Africa is setting-up training courses on maintenance of equipment and machinery, much sought after by sugar-producing countries.

Cost of equipment

205. There are two components of total equipment costs, namely the cost of equipment as such and the installation cost.

206. Most African countries buy turnkey equipment, whereas the Asian and CEPLACEA countries manufacture equipment used for sugar production and are in a position to install imported machinery. This way the reduction of installation costs is significant.

207. Improvement of the viability of the African sugar industry requires the supply of cheap EEC grade II white sugar to users and importers within the continent after overcoming barriers. In this connection, co-operation also needs to be strengthened between African countries.

208. The other area where profitability and viability can be enhanced is the diversification of activities which has been discussed in this paper.

Annex

List of Tables 1/

1/ The tables which concentrate on the data of African countries are taken from the Sugar Yearbook 1989, published by the International Sugar Organization, London.

WORLD SUGAR SITUATION, 1970 to 1989

Year	Pro-duction	Con-sumption	End Year Stocks	Exports	Imports	Net Exports	Net Imports	Free Market Net Exports	Free Market Net Imports	Per Caput Cons.	ISA Daily Price
	Thousand Tonnes - Raw Value									kgs.	US¢/lb.
1970	71,142	70,480	31,586	21,808	21,339	18,168	17,699	14,035	13,656	19.9	3.68
1971	71,975	72,457	30,644	21,035	20,644	17,440	17,049	14,534	14,250	20.3	4.50
1972	73,735	73,660	30,109	21,871	21,234	19,059	18,422	16,657	15,999	20.4	7.27
1973	75,789	76,330	29,343	22,478	22,427	19,548	19,498	16,544	16,622	20.7	9.45
1974	76,397	77,303	27,895	22,097	21,519	19,913	19,336	16,240	15,711	20.0	29.66
1975	78,846	74,438	32,065	20,599	20,495	18,505	18,401	13,351	13,496	18.9	20.37
1976	82,400	79,241	34,266	22,794	21,783	20,040	19,030	15,549	14,682	19.7	11.51
1977	90,350	82,592	40,623	28,471	26,869	25,455	23,854	20,760	19,404	20.2	8.10
1978	90,832	86,354	43,630	25,072	24,807	22,361	22,097	17,490	17,297	20.7	7.81
1979	85,342	90,287	41,639	25,985	25,058	23,408	22,502	18,270	17,715	21.2	9.65
1980	84,489	88,646	37,455	26,832	26,746	23,140	23,093	19,418	19,503	20.2	28.69
1981	92,764	89,906	39,126	29,142	28,223	25,179	24,257	20,628	19,842	19.8	16.83
1982	102,004	93,967	48,015	30,427	29,599	27,291	26,473	21,652	21,157	20.2	8.35
1983	96,971	93,755	49,372	28,981	27,745	25,298	24,062	20,555	19,623	20.2	8.49
1984	99,219	96,681	51,384	28,497	28,058	24,328	23,889	19,197	18,890	20.4	5.20
1985	98,352	97,778	50,641	27,750	26,561	24,202	23,013	18,984	18,239	20.3	4.06
1986	100,288	100,222	50,014	27,168	27,124	22,561	22,517	18,151	18,016	20.6	6.04
1987	103,972	105,266	47,378	28,250	27,583	23,447	22,780	18,492	17,845	21.2	6.75
1988	104,804	105,133	45,848	27,365	26,967	22,980	22,581	18,459	18,329	20.9	10.20
1989	107,864	107,003	44,999	27,905	27,518	22,785	22,398	17,559	17,332	20.9	12.82

PRODUCTION OF CENTRIFUGAL SUGAR, 1983 to 1989
(Tonnes - Raw Value)

Beet sugar = b; cane sugar = c.

Countries		1983	1984	1985	1986	1987	1988	1989
AFRICA								
Algeria	b	5,000	7,000	0	0	0	0	0
Angola	c	60,000	50,000	50,000	50,000	30,000	30,000	25,000
Benin	c	0	3,000	5,000	5,000	5,000	5,000	7,000
Burkina Faso	c	27,704	27,000	10,000	10,000	25,000	25,000	20,000
Burundi	c	0	0	0	0	0	3,384	8,500
Cameroon,Un.Rep.of	c	59,689	59,000	50,000	40,000	28,000	67,423	35,000
Chad	c	26,000	15,000	8,000	10,000	20,000	20,000	25,000
Congo	c	21,100	30,900	25,000	32,000	35,000	40,000	35,000
Côte d'Ivoire	c	180,629	121,336	125,000	120,000	165,000	165,000	160,000
Egypt, Arab Rep. of	b	54,000	70,000	85,000	100,000	90,000	100,000	75,000
	c	668,828	710,000	815,000	850,000	910,000	935,000	872,000
	b + c	(722,828)	(780,000)	(900,000)	(950,000)	(1,000,000)	(1,035,000)	(947,000)
Ethiopia	c	206,981	199,548	191,252	192,939	195,000	168,833	182,740
Gabon	c	16,780	11,000	12,000	18,086	19,000	20,000	15,000
Ghana	c	3,000	0	0	0	0	0	0
Guinea	c	14,000	10,000	5,000	5,000	10,000	10,000	20,000
Kenya	c	345,000	371,094	260,000	200,000	365,000	430,000	440,000
Liberia	c	2,000	3,000	3,000	3,000	3,000	3,000	3,000
Madagascar	c	102,583	78,643	99,017	97,982	107,145	121,806	120,224
Malawi	c	187,463	160,427	154,455	167,847	180,872	187,400	173,331
Mali	c	12,000	10,224	20,987	20,585	17,383	21,002	22,250
Mauritius	c	639,816	609,636	683,576	748,472	732,946	672,087	601,831
Morocco	b	428,000	441,163	433,131	351,711	450,000	590,417	468,815
Mozambique	c	73,706	39,256	60,000	40,000	25,000	40,000	25,000
Nigeria	c	60,000	60,000	50,000	45,000	40,000	31,000	55,000
Rwanda	c	2,000	2,000	2,000	2,000	4,000	4,537	3,364
Senegal	c	50,147	46,660	65,000	72,650	71,000	72,000	70,000
Sierra Leone	c	3,000	5,530	5,00'	5,000	6,000	5,000	5,000
Somalia	c	60,000	45,000	54,000	30,000	35,000	40,000	47,000
South Africa	c	1,584,283	2,275,760	2,540,377	2,248,300	2,234,893	2,469,855	2,292,781
Sudan	c	400,000	360,000	450,000	550,000	525,000	500,000	385,000
Swaziland	c	403,229	429,244	395,884	536,594	461,102	464,131	503,854
Tanzania, Un. Rep.	c	115,767	129,000	105,000	100,000	95,000	80,000	100,000
Togo	c	0	0	0	0	4,000	4,500	5,000
Tunisia	b	6,000	16,115	16,981	21,493	26,901	26,306	22,378
Uganda	c	15,000	20,000	20,000	10,000	20,000	40,000	40,000
Zaire	c	42,500	58,743	65,000	55,000	75,000	75,000	90,000
Zambia	c	132,003	141,231	143,182	119,263	130,341	135,845	132,442
Zimbabwe	c	436,921	463,420	455,643	507,276	459,222	452,883	502,405
Total	b	493,000	534,278	535,112	473,204	566,901	716,723	566,193
Total	c	5,952,129	6,545,651	6,928,373	6,892,004	7,033,904	7,339,686	7,022,722
Total	b + c	6,445,129	7,079,929	7,463,485	7,365,208	7,600,805	8,056,409	7,588,915
WORLD								
Total	b	36,062,216	37,112,397	36,836,085	37,431,908	38,455,570	38,199,847	40,475,941
Total	c	60,908,978	62,106,278	61,515,740	62,856,316	65,486,444	66,604,108	67,387,803
Total	b + c	96,971,194	99,218,675	98,351,825	100,288,224	103,972,014	104,803,955	107,863,744
Beet Sugar as % of Total Production		37.2	37.4	37.5	37.3	37.0	36.4	37.5
Cane Sugar as % of Total Production		62.8	62.6	62.5	62.7	63.0	63.6	62.5

CONSUMPTION OF CENTRIFUGAL SUGAR, 1983 to 1989
(Tonnes - Raw Value)

Countries	1983	1984	1985	1986	1987	1988	1989
AFRICA							
Algeria	620,000	650,000	600,000	575,000	600,000	650,000	700,000
Angola	110,000	105,000	100,000	100,000	77,000	75,000	90,000
Benin	5,000	30,000	30,000	30,000	20,000	20,000	15,000
Botswana	36,276	36,044	37,000	37,000	40,000	45,000	45,000
Burkina Faso	31,204	31,000	35,000	35,000	30,000	30,000	40,000
Burundi	6,012	7,000	7,000	12,100	15,000	13,808	15,216
Cameroon, Un. Rep of	60,000	70,000	60,000	45,000	40,000	62,720	40,000
Cape Verde Islands	7,500	8,500	9,000	10,000	15,000	13,000	12,000
Central African Rep	1,500	2,000	7,000	12,000	5,000	4,000	3,000
Chad	28,000	30,000	30,000	18,000	20,000	20,000	30,000
Comoros	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Congo	18,000	18,000	20,000	20,000	20,000	20,000	25,000
Côte d'Ivoire	102,041	118,748	125,000	125,000	130,000	155,000	160,000
Djibouti	8,000	8,000	8,000	9,000	9,000	10,000	10,000
Egypt, Arab Rep of	1,550,000	1,600,000	1,600,000	1,650,000	1,650,000	1,775,000	1,650,000
Ethiopia	170,124	176,734	144,167	159,093	160,000	138,656	161,791
Gabon	9,239	15,000	18,000	20,000	20,000	20,000	18,000
Gambia	25,000	27,000	30,000	35,000	40,000	60,000	50,000
Ghana	10,000	30,000	30,000	55,000	65,000	80,000	80,000
Guinea	30,000	30,000	35,000	50,000	55,000	40,000	50,000
Guinea Bissau	3,000	3,500	3,000	3,000	3,000	4,000	4,000
Kenya	360,000	347,859	420,000	420,000	450,000	460,000	475,000
Liberia	10,000	10,000	10,000	15,000	15,000	17,000	15,000
Libyan Arab Jamahiriya	130,000	140,000	150,000	190,000	175,000	160,000	150,000
Madagascar	80,462	72,333	83,550	80,697	82,465	78,774	76,126
Malawi	48,482	53,441	61,694	73,453	88,634	108,209	106,965
Mali	40,000	40,000	44,000	47,000	55,000	50,000	70,000
Mauritania	35,000	25,000	25,000	40,000	70,000	65,000	70,000
Mauritius	39,239	39,867	38,889	40,440	40,087	40,672	39,605
Morocco	700,000	680,550	707,037	725,103	700,000	756,208	739,784
Mozambique	74,136	89,895	90,000	90,000	60,000	45,000	55,000
Niger	5,000	10,000	30,000	30,000	30,000	25,000	20,000
Nigeria	900,000	550,000	600,000	650,000	625,000	425,000	335,000
Rwanda	5,000	12,000	17,000	19,000	12,000	12,000	10,000
Senegal	80,000	70,893	75,000	70,953	80,000	80,000	90,000
Sierra Leone	13,000	15,000	18,000	16,000	17,000	20,000	16,000
Somalia	70,000	100,000	90,000	90,000	80,000	60,000	50,000
South Africa	1,339,799	1,333,530	1,367,612	1,380,964	1,433,481	1,416,732	1,390,000
Sudan	450,000	450,000	470,000	550,000	600,000	550,000	440,000
Swaziland	21,257	22,172	22,434	24,306	34,625	41,322	49,153
Tanzania, Un. Rep of	120,000	122,000	126,000	115,000	100,000	85,000	100,000
Togo	26,000	50,000	50,000	50,000	40,000	45,000	55,000
Tunisia	190,000	179,730	211,900	189,074	211,632	202,312	191,920
Uganda	20,000	21,000	22,000	30,000	70,000	70,000	70,000
Zaire	70,000	85,000	90,000	95,000	120,000	120,000	110,000
Zambia	110,703	117,895	112,911	98,963	107,235	114,584	105,019
Zimbabwe	212,053	222,556	224,661	237,955	253,139	269,966	282,595
Other Africa	1,000	3,000	3,500	4,500	5,000	2,000	5,000
Total	7,985,027	7,563,249	8,092,363	8,376,594	8,572,297	8,558,963	8,319,174
WORLD TOTAL	93,754,783	96,680,855	97,777,930	100,221,798	105,265,591	105,133,014	107,002,747

EXPORTS OF CENTRIFUGAL SUGAR, 1983 to 1989
(Tonnes - Raw Value)

Countries	1983	1984	1985	1986	1987	1988	1989
AFRICA							
Botswana	0	0	0	4	0	0	0
Cameroon, Un. Rep of	14,226	3,344	205	19,475	0	2,500	0
Congo	20,898	31,390	24,454	17,059	18,000	19,000	13,000
Côte d'Ivoire	84,611	45,528	22,210	22,000	18,000	20,000	21,000
Djibouti	15,000	35,000	30,000	35,000	10,000	0	20,000
Egypt, Arab Rep of	18,747	0	0	0	0	0	0
Ethiopia	18,763	38,405	26,865	23,716	25,000	26,950	28,567
Gabon	8,400	6,000	5,000	5,000	5,000	0	0
Gambia	16,000	26,000	30,000	35,000	15,000	25,000	0
Kenya	8,918	4,337	0	0	0	0	0
Liberia	0	8	0	0	0	0	0
Madagascar	44,986	18,838	34,925	0	19,156	18,977	77,822
Malawi	94,516	89,442	142,588	93,354	116,131	104,119	58,579
Mauritius	643,592	561,859	571,190	661,651	695,475	691,674	673,972
Morocco	6,800	0	0	0	0	0	0
Mozambique	25,328	16,409	9,955	20,227	19,000	37,000	13,000
Nigeria	0	2	0	0	0	0	0
South Africa	569,145	687,140	1,025,226	873,677	1,104,922	909,159	924,032
Swaziland	373,383	390,980	379,874	497,804	435,104	403,846	406,793
Tanzania, Un Rep of	21,327	11,002	11,684	10,506	10,000	11,000	11,000
Tunisia	0	0	4,331	3,616	0	1,950	0
Zaire	42	0	0	0	0	0	0
Zambia	107	6,287	9,089	36,860	23,339	5,330	2,077
Zimbabwe	226,016	233,809	219,587	270,351	241,013	148,585	171,706
Total	2,210,805	2,205,780	2,547,183	2,625,320	2,755,140	2,425,090	2,421,548
WORLD TOTAL	28,981,442	28,497,212	27,750,140	27,167,730	28,249,939	27,365,186	27,905,140

IMPORTS OF CENTRIFUGAL SUGAR, 1983 to 1989
(Tonnes - Raw Value)

Countries	1983	1984	1985	1986	1987	1988	1989
AFRICA							
Algeria	550,209	594,857	531,900	487,000	653,000	751,000	679,000
Angola	41,277	46,576	52,000	59,000	42,000	47,000	65,000
Benin	5,000	32,676	29,100	30,000	4,000	13,000	6,000
Botswana	36,276	36,044	40,647	39,111	40,832	47,200	43,000
Burkina Faso	4,857	8,612	28,491	16,657	5,000	5,000	20,000
Burundi	4,881	11,284	9,190	13,556	14,000	19,516	5,675
Cameroon, Un. Rep. of	166	34,643	6,339	11,601	9,000	1,544	5,000
Cape Verde Islands	8,870	8,460	8,022	8,291	21,000	6,000	11,000
Central African Rep.	1,320	1,711	8,892	12,858	5,000	4,000	0
Chad	22	15,240	21,703	8,738	0	1,000	9,000
Comoros	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Congo	12,270	9,655	19,930	3,754	1,000	2,000	2,000
Côte d'Ivoire	12,789	22,703	32,448	27,000	17,000	14,000	17,000
Djibouti	22,435	47,477	29,930	52,060	15,000	10,000	29,000
Egypt, Arab Rep. of	911,732	901,302	711,000	744,000	669,000	851,000	617,000
Gabon	11	2,181	1,195	50	0	0	0
Gambia	40,925	51,296	60,647	71,000	57,000	68,000	46,000
Ghana	8,141	33,003	34,050	53,083	69,000	94,000	73,000
Guinea	7,648	19,934	36,130	44,000	46,000	27,000	32,000
Guinea Bissau	1,187	3,602	2,778	2,889	3,000	4,000	4,000
Kenya	36,134	74,695	110,000	187,000	86,000	19,000	58,000
Liberia	13,303	7,546	10,400	11,000	10,000	15,000	10,000
Libyan Arab Jamahiriya	187,192	92,518	226,000	160,000	126,000	147,000	139,000
Madagascar	26,834	0	11,847	0	7,228	0	0
Mali	27,091	30,000	26,534	21,000	52,000	18,000	59,000
Mauritania	20,443	16,429	23,290	47,345	87,000	51,000	69,000
Morocco	223,694	319,349	243,477	338,262	268,000	276,000	276,000
Mozambique	18,820	66,500	30,000	52,262	58,000	21,000	53,000
Niger	3,906	14,376	31,504	31,438	30,000	21,000	18,000
Nigeria	863,261	439,215	518,000	578,329	625,000	358,300	264,000
Rwanda	2,554	14,029	17,700	16,929	3,000	6,388	6,000
Senegal	47,617	22,347	1,147	7,000	17,000	4,000	19,000
Sierra Leone	4,632	9,254	14,465	10,000	12,000	15,000	11,000
Somalia	2,449	61,660	28,000	96,000	24,000	8,000	0
South Africa	191,860	7,154	28,767	0	0	0	0
Sudan	53,439	39,411	11,576	4,934	111,000	19,000	6,000
Tanzania, Un Rep of	5,473	12,537	21,624	26,704	13,000	16,000	10,000
Togo	26,717	57,929	51,557	50,280	29,000	43,000	50,000
Tunisia	192,763	158,398	191,695	172,262	179,000	184,170	178,458
Uganda	388	3,161	884	24,842	84,000	10,000	16,000
Zaire	24,532	34,208	30,429	47,466	43,000	29,000	3,000
Zambia	0	0	0	0	0	7,586	0
Zimbabwe	0	5,270	8,046	0	0	0	0
Other Africa	1,269	2,792	3,551	4,540	5,000	2,000	5,000
Total	3,647,387	3,373,034	3,307,276	3,575,181	3,543,060	3,258,404	2,935,133
WORLD TOTAL	‡ 27,745,385	‡ 28,058,367	‡ 26,561,121	‡ 27,123,617	‡ 27,582,754	‡ 26,966,545	‡ 27,517,650

‡ Including adjustment for unknow net-trade cf. 1983 - 210,000 t.; 1984 - 95,000 t.; 1985 - 90,000 t.; 1986 - 579,000 t.; 1987 - 644,000 t.; 1988 - 717,000 t, 1989 - 1,345,000 t

WORLD PER CAPUT CONSUMPTION OF CENTRIFUGAL SUGAR*, 1983 to 1989
(Kilogrammes - Raw Value)

Countries	1983	1984	1985	1986	1987	1988	1989
EUROPE							
Albania	16.0	17.2	18.6	19.2	19.5	20.7	21.9
Austria	43.5	47.7	46.0	47.1	39.3	40.3	39.7
Bulgaria	48.1	50.8	52.5	52.8	53.0	53.0	50.0
Cyprus	27.0	31.8	29.9	30.3	30.2	24.5	29.0
Czechoslovakia	47.3	51.7	51.6	51.5	48.2	48.0	51.2
E.E.C.	38.5	39.0	39.1	37.6	37.8	35.9	39.0
Finland	41.0	39.0	41.0	42.5	41.9	44.9	43.6
French Terr.	27.6	34.5	25.8	32.3	31.3	30.3	36.4
German Dem. Rep.	47.6	44.0	45.5	44.9	44.5	47.2	46.3
Gibraltar	23.3	25.0	33.3	33.3	33.3	33.3	66.7
Hungary	40.2	45.4	49.5	49.3	52.2	46.0	54.1
Iceland	45.1	46.1	47.6	50.8	52.0	56.0	57.7
Malta	44.0	40.9	52.0	43.0	44.7	43.4	49.4
Norway	39.2	40.4	42.1	40.8	41.4	35.0	39.7
Poland	50.9	54.3	45.4	43.9	49.1	48.9	47.4
Portugal	29.7	28.5	32.3	(-)	(-)	(-)	(-)
Romania	26.6	30.9	28.6	26.3	26.2	21.7	25.9
Spain	27.2	30.0	24.9	(-)	(-)	(-)	(-)
Sweden	45.8	45.8	46.2	46.2	44.3	45.4	44.4
Switzerland	43.7	42.9	42.8	45.1	42.8	44.1	43.4
Turkey	28.2	29.6	27.4	29.5	32.3	29.3	30.7
U.S.S.R.	47.4	48.0	45.3	47.6	49.8	48.8	47.9
Yugoslavia	34.9	39.1	41.1	40.8	40.6	36.2	38.3
Average	41.4	42.1	40.6	41.6	42.7	42.0	42.4
NORTH AMERICA							
Canada	40.6	42.6	41.4	43.0	43.5	42.4	40.0
U.S.A.	34.5	32.7	30.5	29.3	30.2	30.2	30.3
Average	35.1	33.6	31.5	30.6	31.6	31.3	31.2
CENTRAL AMERICA							
Bahamas	31.8	39.1	41.3	39.6	47.9	37.5	56.0
Barbados	59.3	56.0	53.9	53.6	52.9	55.7	51.5
Belize	43.2	48.4	39.4	38.7	39.4	40.2	40.4
Bermuda	40.0	40.0	36.7	36.7	33.3	66.7	30.0
Costa Rica	57.4	62.0	60.2	60.7	59.7	59.3	58.6
Cuba	68.5	69.7	65.3	66.0	68.7	67.1	68.0
Dominican Republic	40.1	42.4	48.7	46.0	52.3	31.8	35.4
El Salvador	30.1	31.1	33.0	33.5	34.0	31.4	31.2
Guatemala	35.6	33.5	34.5	36.6	36.0	38.3	39.5
Haiti	11.3	10.2	11.8	11.2	11.0	10.0	12.5
Honduras	23.8	30.1	27.4	28.6	25.8	31.3	32.3
Jamaica	45.3	45.4	46.3	44.2	46.9	48.0	53.0
Mexico	44.1	44.6	45.3	43.4	45.0	49.2	47.6
Netherlands Antilles	32.0	34.6	29.6	32.1	42.1	42.1	30.0
Nicaragua	46.2	48.7	44.5	46.5	43.2	37.6	40.1
Panama	38.3	35.5	36.3	36.1	30.8	34.5	42.2
St. Christopher-Nevis	43.7	41.7	43.2	44.0	43.1	40.0	37.6
Trinidad & Tobago	55.2	56.4	55.1	55.8	49.2	51.6	51.2
Other Cent. America	41.7	32.7	39.2	43.1	56.8	52.8	39.6
Average	43.0	44.0	45.9	43.8	44.7	46.0	46.7
SOUTH AMERICA							
Argentina	33.4	32.9	30.9	35.2	33.5	27.1	27.7
Bolivia	28.8	31.3	29.4	29.0	27.9	26.2	23.6
Brazil	46.1	47.2	44.8	47.6	46.5	43.2	50.2
Chile	34.7	35.6	33.5	35.2	36.8	36.4	38.3
Colombia	33.7	32.8	34.5	38.9	36.8	37.8	34.4
Ecuador	38.7	38.4	34.5	36.6	38.6	30.5	31.1
Guyana	58.7	52.4	39.7	43.6	55.7	47.1	41.2
Paraguay	22.5	23.8	21.7	21.1	20.4	24.8	26.4
Peru	30.9	32.3	33.0	36.3	41.5	37.5	34.4
Suriname	40.0	41.7	43.2	42.1	36.8	27.8	37.5
Uruguay	32.9	31.8	31.6	27.3	29.6	25.9	22.0
Venezuela	43.1	42.2	40.7	42.6	42.5	45.5	36.7
Average	40.3	40.8	39.1	42.1	42.0	38.4	41.5
ASIA							
Afghanistan	7.0	5.7	4.4	5.4	3.9	5.2	3.5
Bangladesh	2.4	2.7	3.3	3.4	3.3	2.9	2.6
Brunei	30.0	27.3	27.3	26.1	30.4	33.3	32.0
China	5.3	5.4	6.0	6.3	6.9	7.0	6.4
Taiwan Province	25.4	24.8	25.1	28.0	27.8	27.1	27.3
Hong Kong	20.7	23.3	24.0	24.4	24.9	26.4	26.0
India	9.9	11.2	12.0	11.4	12.3	13.0	13.2
Indonesia	12.4	11.0	11.0	12.6	13.5	14.7	14.5
Iran	20.5	28.8	29.4	28.7	25.1	21.7	18.5
Iraq	34.2	39.7	37.7	36.1	35.3	33.3	29.5
Israel	53.7	71.6	59.1	58.1	57.2	56.4	55.4
Japan	23.3	23.0	23.9	22.5	22.1	23.7	22.8
Jordan	39.6	40.2	38.5	50.1	39.5	38.0	39.2
Kampuchea	0.7	0.7	0.7	0.7	0.6	0.6	0.6
Korea Dem. People's R.	6.3	6.1	5.9	5.8	5.7	5.5	5.4
Korea, Rep. of	11.7	13.1	13.4	15.3	15.9	16.0	17.5
Kuwait	41.9	36.3	38.0	38.0	34.8	30.6	29.3
Lao People's Dem. Rep.	1.4	1.4	1.5	1.4	1.4	1.6	1.5

Countries	1983	1984	1985	1986	1987	1988	1989
ASIA *(cont.)*							
Lebanon	19.1	26.6	26.2	26.2	34.5	39.0	38.2
Macao	7.8	9.4	7.7	7.1	7.0	6.8	6.5
Malaysia	31.0	38.4	38.3	38.2	34.7	37.7	37.4
Maldives	34.4	29.4	30.6	33.3	47.4	45.0	33.3
Mongolia	22.8	22.3	22.2	23.2	22.6	23.9	23.1
Myanmar	2.0	2.3	2.7	2.7	2.4	0.6	0.7
Nepal	1.3	2.2	2.1	2.3	2.0	2.2	1.9
Pakistan	13.4	13.9	14.6	17.5	19.0	18.5	19.2
Persian Gulf	40.2	39.4	38.0	25.1	51.4	34.2	32.1
Philippines	23.2	24.1	24.5	21.1	25.1	20.9	24.5
Saudi Arabia	40.9	41.4	40.8	29.2	27.9	28.5	27.7
Singapore	52.0	49.6	50.8	56.0	67.0	75.5	70.9
Sri Lanka	15.8	19.2	22.1	21.7	18.3	13.7	17.0
Syrian Arab Rep.	34.5	33.3	32.1	36.4	30.8	33.1	30.7
Thailand	13.4	14.0	14.1	14.1	16.4	16.4	17.7
Vietnam, Soc. Rep. of	3.8	3.8	3.5	3.8	4.8	7.8	7.6
Yemen Arab Rep.	23.1	34.5	29.2	28.4	27.6	31.9	25.2
Yemen Dem. Rep.	34.7	35.9	34.9	31.8	26.6	25.9	18.8
Average	9.9	10.5	11.0	11.1	11.8	11.9	11.7
AFRICA							
Algeria	29.6	30.8	27.6	25.7	25.9	27.3	28.6
Angola	11.8	12.3	11.4	11.2	8.4	7.9	9.3
Benin	1.3	7.8	7.6	7.4	4.7	4.5	3.3
Botswana	35.8	34.3	33.9	32.7	34.2	37.2	35.7
Burkina Faso	4.8	4.5	5.3	5.2	4.4	3.5	4.5
Burundi	1.4	1.5	1.5	2.4	3.0	3.1	3.0
Cameroon, Un Rep. of	6.6	7.2	5.9	4.3	3.7	6.3	3.5
Cape Verde Islands	18.2	26.6	27.3	30.3	44.1	36.1	32.4
Central African Rep.	0.6	0.8	2.7	4.4	1.9	1.4	1.0
Chad	5.2	6.1	6.0	3.5	3.8	3.7	5.4
Comoros	6.8	7.0	6.8	6.3	6.0	6.3	5.9
Congo	10.9	10.7	11.5	11.2	10.9	10.6	12.9
Côte d'Ivoire	11.3	12.5	12.7	12.5	12.4	13.4	13.3
Djibouti	22.2	23.5	18.6	19.6	18.4	25.6	25.0
Egypt, Arab Rep. of	27.4	33.9	33.0	33.0	32.5	34.2	31.1
Ethiopia	5.1	4.2	3.4	3.6	3.5	2.9	3.3
Gabon	15.2	13.0	15.7	17.1	16.8	19.8	15.9
Gambia	40.3	42.2	46.9	53.8	59.7	74.1	60.2
Ghana	1.1	2.3	2.2	3.9	4.5	5.8	5.5
Guinea	5.8	5.7	5.8	8.1	8.6	7.9	9.6
Guinea Bissau	3.4	4.0	3.4	3.3	3.2	4.3	4.2
Kenya	18.8	17.8	20.7	19.8	19.6	19.3	19.1
Liberia	4.9	4.7	4.6	5.0	6.4	6.8	6.0
Libyan Arab Jamahiriya	37.5	38.7	41.7	52.8	45.7	37.8	34.2
Madagascar	8.8	7.4	8.3	7.4	8.1	6.9	6.5
Malawi	7.5	8.2	8.2	9.8	11.8	12.7	12.6
Mali	5.3	5.2	5.4	5.9	7.0	6.2	7.6
Mauritania	19.7	13.7	13.2	20.7	34.8	34.0	35.9
Mauritius	39.2	39.0	37.6	40.8	38.1	37.0	37.0
Morocco	29.3	29.8	31.7	32.9	30.4	32.3	30.9
Mozambique	7.1	6.6	6.4	6.3	4.1	3.0	3.6
Niger	0.9	1.7	4.9	5.0	4.4	3.7	2.9
Nigeria	10.5	6.0	6.3	6.6	6.1	4.0	3.1
Rwanda	0.7	2.0	2.7	3.0	1.9	2.0	1.4
Senegal	12.7	11.8	11.6	11.3	11.9	11.6	12.3
Sierra Leone	3.7	4.2	5.0	4.4	4.5	5.1	4.0
Somalia	13.1	18.5	19.4	18.9	16.4	8.5	6.8
South Africa	40.7	39.5	42.6	40.0	34.0	36.3	30.9
Sudan	22.1	21.5	21.8	24.9	26.3	23.1	18.0
Swaziland	36.7	37.6	34.5	41.0	53.0	57.4	64.7
Tanzania, Un. Rep. of	6.2	5.8	5.8	5.8	5.2	3.5	4.0
Togo	8.8	17.7	16.9	15.8	11.1	13.9	16.4
Tunisia	27.5	24.0	29.8	25.2	27.6	27.0	24.6
Uganda	1.4	1.4	1.4	1.9	4.8	4.1	3.9
Zaire	2.2	2.8	3.0	3.0	3.7	3.6	3.2
Zambia	17.6	18.3	17.1	14.8	15.0	16.0	13.5
Zimbabwe	26.7	27.8	27.3	28.0	28.7	29.7	30.2
Other Africa	2.0	5.8	6.1	7.8	8.5	3.4	9.4
Average	15.6	14.6	14.7	14.7	14.5	14.0	13.2
OCEANIA							
Australia	49.1	48.2	49.5	51.2	51.0	51.1	50.9
Fiji	55.0	51.9	51.1	48.3	48.9	53.1	50.6
New Zealand	48.5	51.1	52.3	50.8	51.8	51.7	49.8
Papua New Guinea	9.4	8.5	8.0	10.3	8.6	8.3	8.2
Western Samoa	21.4	18.8	20.0	18.8	18.8	18.8	17.6
Other Oceania	10.0	10.0	12.0	20.3	17.8	15.8	13.0
Average	42.5	42.1	42.4	44.0	43.4	43.8	43.3
WORLD AVERAGE	20.2	20.4	20.3	20.6	21.2	20.9	20.9

* Calculated on the basis of the apparent disappearance of sugar within each country

WORLD SUGAR PRICES, 1982 to 1989

Year	LONDON DAILY L.D.P. c.i.f. f.o. U.K. in bulk	PRICE (RAWS) Nominal Freight & Insurance Element (Carib./U.K.)	Equivalent*	NEW YORK No.11 Contract† (Spot)	I.S.A. Daily Price**	LONDON Rate of Exchange
			f.o.b. & stowed Carribbean Port, in bulk			
	£ per tonne			U.S. cents per lb.		U.S. $ per £
1982	118.77	13.23	8.44	8.36	8.35	1.7475
1983	141.14	14.58	8.60	8.51	8.49	1.5159
1984	103.47	16.50	5.32	5.14	5.20	1.3368
1985	80.99	16.49	4.22	4.04	4.06	1.2973
1986	104.20	12.19	6.14	6.04	6.04	1.4677
1987	107.95	14.66	6.94	6.71	6.75	1.6405
1988	148.79	18.13	10.47	10.16	10.20	1.7803
1989	196.11	19.74	12.97	12.80	12.82	1.6380

* London Daily Price adjusted to f.o.b and stowed Caribbean Port, in bulk, by deducting the cost of insurance and freight. Converted from £ sterling at the closing spot rate of exchange in London for the relevant day, between the £ sterling and the U.S. dollar.

** The International Sugar Agreement Daily Price is the arithmetical average of the New York Coffee and Sugar Exchange Contract No. 11 spot price and the London Daily Price after conversion of the latter to U.S. cents per pound avoirdupois f.o.b. and stowed Caribbean Port in bulk or, if the difference between these two f.o.b. prices is more than ten points the lower of the two prices plus five points.