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CANE SUGAR FOR GABRIELA CHOCOLATE
sweet dreams or reality

A research written on behalf of
the Foundation Max Havelaar

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Amsterdam
January 1993

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ANNEXES

LITERATURE

1. STRUCTURE OF THE WORLD SUGAR MARKET

1.1 Production and trade

The annual world production of sugar amounts more than 100 million tons. About two thirds of the production consists of cane sugar and one third of beet sugar. As we can see in table 1 the relative share of cane sugar in the total production has slightly increased over time. This is due to a higher consumption level in the third world sugar producing countries. Cane sugar is mainly produced in third world countries, and for several of these countries sugar is the most important export product.

**Table 1 World sugar production
(in raw sugar)**

Year	Beet sugar		Cane sugar		Total 1000 tonnes
	1000 tonnes	%	1000 tonnes	%	
1950/51	14,046	35.7	25,320	64.3	39,366
1960/61	24,306	39.7	36,848	60.3	61,154
1970/71	29,458	35.8	52,828	64.2	82,286
1980/81	32,788	33.1	66,147	66.9	98,935
1985/86	36,925	33.7	74,294	66.3	111,343
1987/88	38,046	32.9	77,472	67.1	115,518
1988/89	40,847	35.2	75,224	64.8	116,071
1989/90	39,234	32.3	82,379	67.7	121,613
1990/91	41,770	32.7	86,069	67.3	127,839
1991/92f	37,933	30.5	86,365	69.5	124,298

f = forecast

Source: *Zuckerwirtschaft Taschenbuch*

The world sugar market is dominated by a few large exporting and importing countries. Table 2 shows that the most important sugar exporting countries are the European Community, Cuba, Brazil, Thailand and Australia. It is to be noted that for smaller exporting countries sugar exports can be an important source of agricultural export incomes. For example, in 1989 for the large exporter Cuba sugar exports generated 86% of total agricultural export incomes, but also for the small exporting countries Mauritius and Guyana this percentage was respectively 92 and 37 (UNCTAD Commodity yearbook). Table 3 shows the most important importing countries: GOS, USA, China, Japan and South-Korea.

**Table 2 Most important sugar producing and exporting countries
(in 1000 tonnes raw sugar)**

Country		1989		1990		1991	
		prod.	/ export	prod.	/ export	prod.	/ export
Europe	b+c	32,826	/ 6,070	34,147	/ 6,117	29,863	/ 5,722
Cuba	c	8,000	/ 7,123	7,800	/ 7,172	6,000	/ 6,767
Mexico	c	3,100	/ 334	3,600	/ 5	3,500	/ 253
Brasil	c	7,793	/ 965	7,900	/ 1,577	9,133	/ 1,614
Colombia	c	1,611	/ 323	1,595	/ 416	1,653	/ 293
Mauritius	c	602	/ 674	661	/ 612	625	/ 584
South-Afrika	c	2,289	/ 924	2,152	/ 833	2,429	/ 897
China	c+b	5,668	/ 465	7,020	/ 620	7,480	/ 475
India	c	11,940	/ 30	13,748	/ 46	14,650	/ 335
Thailand	c	3,502	/ 3,105	3,954	/ 2,496	5,000	/ 2,863
Philippines	c	1,750	/ 194	1,718	/ 259	1,850	/ 280
Australia	c	3,844	/ 3,149	3,637	/ 3,069	3,180	/ 2,456
USA	b	3,122		3,485		3,383	
	c	2,099	/ 415	2,115	/ 464	2,455	/ 623

b = beet sugar

c = cane sugar

production 1989 refers to season 1989/90

production 1990 refers to season 1990/91

production 1991 refers to the forecast for season 1991/92

Source: *Zuckerwirtschaft Taschenbuch*

Note: In this table the EC is included in Europe, for more detailed information on the EC see table 5. In table 5 we can see the largest part of European exports originates from the EC.

**Table 3 Most important sugar importing countries
(in 1000 tonnes raw sugar)**

Country	1989	1990	1991
Europe	9,458	7,922	7,568
GOS (USSR)	5,613	4,082	4,906
Canada	978	949	957
USA	1,636	2,110	1,685
China	1,606	1,379	1,260
India	53	-	-
Japan	1,850	1,752	1,895
South-Korea	1,158	1,097	1,160
Egypt	617	805	736

Source: *Zuckerwirtschaft Taschenbuch*

Note: In this table the EC is included in Europe, for more detailed information on the EC see Table 5.

A few interesting developments have been taking place in the world sugar market. Until the mid-

seventies the European Community was a net-importer of sugar. But since then, it has developed ^{EC} itself into a net-exporter of sugar, and now the EC is one of the biggest exporters at the world market. This spectacular change is largely due to the European price policy regarding sugar (see chapter 2 for more information). The sugar of another important exporter, Cuba, has always been directed at the USSR (GOS nowadays). Cuba now finds itself in an uncertain position because of the political changes in the GOS, and it is to be seen if Cuba keeps its ^{favoured} favourite position in the GOS sugar market.

A recent development that must be mentioned, is the introduction of maize-sweeteners (HFCS). Via biotechnological innovations it has become possible to produce sweeteners out of maize. This development started about 20 years ago, and is quickly gaining importance in the sugar market. Especially in the United States, where the sugar market already for 50% consists of HFCS. In most other countries the use of HFCS isn't developing as quick as in the US, since ^{many} lots of countries have restricted the production of HFCS to protect their sugar production. The EC for example has determined very limited quota for the production of HFCS (for the exact amounts see annex 1). In spite of the restraints we can also see in Europe a rise of factories specializing in the production of HFCS waiting for politics to change? ^{Substituted}

1.2 World market price of sugar

Not all sugar is traded under conditions of the free world market. For example the EC and the United States maintain special arrangements with several third world countries regarding guaranteed quantities and prices of sugar imports. Also Cuba's sugar exports to The GOS take place under a preferential arrangement. About one third of the sugar trade is regulated by some kind of special arrangement. However, the majority of the sugar exporting third world countries sell more than half of their exports on the free world market. And for example Thailand, a large sugar exporter, isn't favoured by any kind of preferential arrangement at all, and has to sell on the free world market. In the 1980's, the countries having a special arrangement with the United States, where confronted with a reduction in their export quatum. The main reason for this reduction is the substitution of cane sugar by HFCS. So for third world countries the dependence on the world market has increased.

Besides the inconvenience of insecure sales potential, dependence on the free world market also means strong fluctuations in incomes out of sugar exports. As we can see in table 4, the sugar price on the free world market shows strong fluctuations. Since the dramatic price fall in 1985, the price has recovered, but remains at a low level. For example, the world market price in januari 1993 was f 41,06 for 100 kg.'s of raw sugar, while the ACP countries under the preferential arrangement with the EC, received a price of f 166,55 for 100 kg.'s of raw sugar.

Table 4 Development of the world market price of sugar
(average prices of raw sugar in US \$-cents per kilo)

1970	8.1
1975	45.0
1978	17.2
1980	63.2
1983	18.7
1985	8.9
1986	13.3
1987	14.9
1988	22.5
1989	28.1
1990	27.6
1991	19.7
1992 ⁽¹⁾	18.5
1993 ⁽²⁾	23.0

(1) quotation of januari 1992
(2) quotation on 11 januari 1993

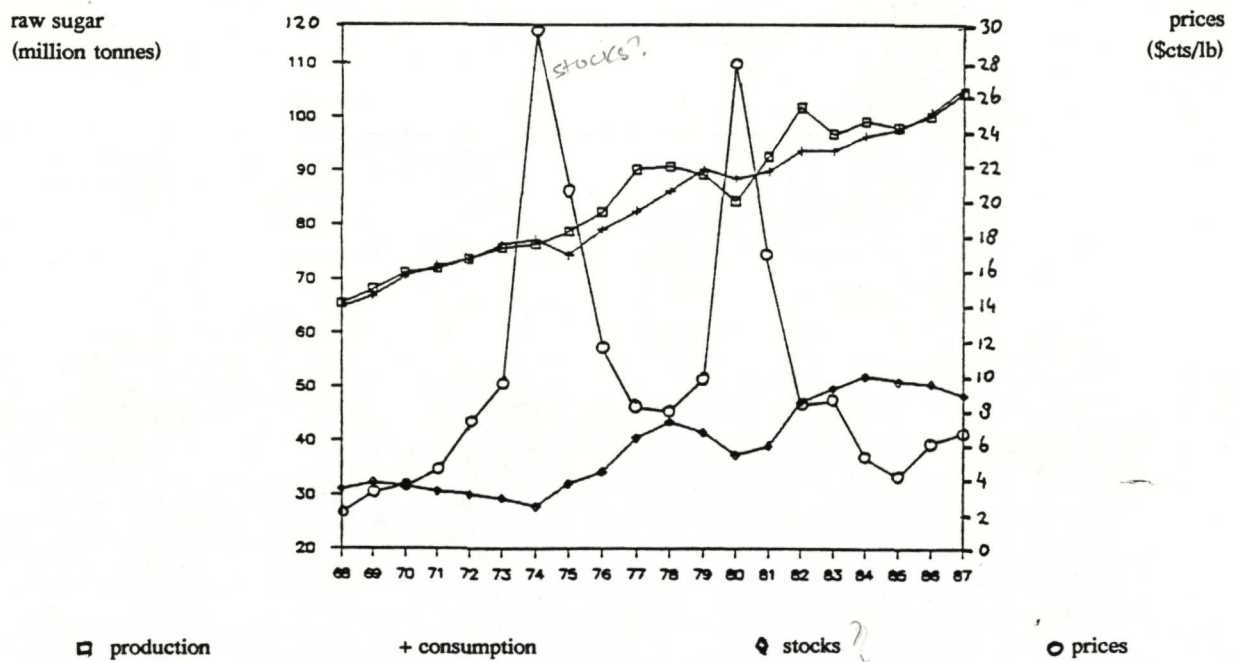
Source: Zuckerwirtschaft Taschenbuch

The fluctuating sugar prices are not directly related to the amount of production, but to the stocks of sugar; in case of large stocks the price will go down (see figure 1).

Sugar has a long tradition of quotation on the stock exchange, so the price fluctuations are not related to a switch to stock quotation (as for example is the case for coffee prices).

figure 1 World sugar situation and prices

(Source: W. Polder and R. Stellinga, 1989)



1.3 Leading traders and processors in the sugar market

Sugar trade and processing is for the largest part the domain of a few multinational corporations. The most important trader and processor is the English company Tate & Lyle.^① Already in 1980 Tate & Lyle was the leading trader in sugar, and number three on the list of leading processors. Another important trader is the French company Sucres et Denrees.^② This multinational is about as important a trader as Tate & Lyle, but it is principally operating on the free world market. Recently, in 1990, it has expanded its activities in the important exporting country Brasil. Sucres et Denrees is now trading 80% of the Brasilian export. Also Sucres et Denree controls the Cuban sugar trade to the GOS.

Tate & Lyle's activities as a processor were concentrated in the processing of cane sugar, and it dominated this sector in the EC and Canada. At the end of the eighties Tate & Lyle expanded its activities in the United States through takeover purchases. They took over the cane sugar processor Amstar Sugar, and also the beet sugar processor Western Sugar Company. In this way Tate & Lyle became the only processor of cane and beet sugar in the United States. In annex 2 we present an overview of Tate & Lyle's worldwide activities.

In Europe the largest processor of beet sugar is the Italian multinational Ferruzi. In the EC not only private companies play their part, also national cooperative sugar processors are important actors on the sugar market. The cooperatives only operate in the beet sugar market, a market characterized by strong concentration. In each country there are only 1 to 5 cooperatives and/or companies involved in the processing of beet sugar. In annex 3 is presented an overview of the cooperatives/companies operating on the beet sugar market in the EC. There is a tendency of growing concentration among the cooperatives, shown for example by the takeover of the Belgian cooperative Tiense Suikerraffinaderijen by the German cooperative Sudzucker.

The processing of cane sugar in Europe is, as already mentioned, dominated by Tate & Lyle. The largest part of the import of raw sugar cane comes from the ACP-countries, under preferential arrangements with the EC. Tate & Lyle trades and processes 90% of these imports.

The production of maize sweeteners, HFCS, is mainly concentrated in the United States. The leading processor is Archer Daniels Midland. Tate & Lyle has not only expanded its activities in the 'traditional' sugar production in the US, but has also expanded to this part of the sugar market. By the takeover of Staley-Continental (in 1988) it has become the second largest HFCS producer in the United States.

The leading producer of HFCS in Europe is Ferruzi, followed by the CST-group (Cereal Science & Technology). Not surprisingly Tate & Lyle owns an important share of the CST-group.

2. STRUCTURE OF THE EC SUGAR MARKET

2.1 Introduction

The European Community used to be a large importer of sugar. Due to the price policy executed, EC production of beet sugar has sharply risen. Already in the mid-seventies the EC became a net-exporter of sugar, and nowadays it is one of the largest sugar exporters in the world (see table 5). The EC sugar policy is very complex, because it not only regulates the quantity and price of the beet sugar produced in the EC. Also the external trade structure is regulated by the EC policy, since effective internal market regulation must be completed by protectionist measures like import levies and export refunds. Within the EC sugar policy is an exceptional case, because of the special position of the so called 'ACP countries'. These former colonies of England have a preferential position at the EC import market. They are allowed to import a certain quantity of cane sugar against a guaranteed price, a price far above the world market price. And they don't have to pay the import levies on sugar. In the following all these different aspects of EC sugar policy will be briefly discussed.

?WHAT?

**Table 5 European Community: sugar production and trade
(in 1000 tonnes white sugar)**

	1974/75	1977/78	1981/82	1985/86	1989/90	1990/91
production	8,565	11,527	15,026	13,626	14,272	15,882
import ⁽¹⁾	1,819	2,032	1,320	1,821	1,928	1,860
export	97	3,434	5,183	4,204	4,838	4,900*
quotum sugar	78	2,641	2,653	2,982	2,565	2,600*
C-sugar	19	793	2,530	1,222	2,273	2,300*
trade balance (export - import)	-1,722	1,402	3,863	2,383	2,910	3,040*

* estimate

(1) imports include the sugar in processed products.

Source: Commission EC, *The state of agriculture*.

2.2 Beet sugar production

As already mentioned EC policy stimulates the production of beet sugar. Sugar producers are offered a guaranteed price, that is far above the world market price. To protect the own sugar production the EC demands high import levies on imported sugar. Sugar imports are made so expensive that the EC market is effectively protected. The excedent production in the EC must be sold at the world market. To be able to compete at the world market the EC offers export refunds for sugar. At the end of the 1970's this system of market regulation becomes very costly for the EC, due to the large amounts of excedent production that has to be sold at the world

market (supported by export refunds). So in 1981 EC policy is changed by the introduction of the 'quota system', meant to reduce the excedent production. This quota system still functions nowadays.

Within the quota system every country is allowed to produce a determined quantity of sugar. The allocated quatum is divided in an A-quotum and B-quotum (see annex 1 for an overview of the allocated quota). The A-quota are equal to the amount of sugar that will be consumed in the EC. The B-quota are meant as a buffer in cases of failing harvests. The EC offers a guaranteed price for the A- and B-sugar. The guaranteed price for A-sugar is higher than for B-sugar. Besides the production of A- and B-sugar, there is also production of the so called C-sugar. The EC doesn't offer a guaranteed price for this C-sugar. The C-sugar is all exported at the actual worldmarket price. However, the allowed quota are determined much too broad. So not only the C-sugar, but also the largest part of the B-sugar is exported (see table 5). The EC offers an export refund only for the quatum-sugar. The level of the refund is based on the difference between the target price (f 147,98 / 100 kg.'s in 1992/93) and the worldmarket price. During the 1980's the refund was almost 75% of the target price.

The allocated quota of each country are distributed among the individual factories or companies in that country. The majority of the factories are cooperatives. In every country the sugar market is controlled by only a few factories or companies. For example in the Netherlands CSM and the Suikerunie together control the complete market. For an overview of the distribution of the quota among the factories in the EC countries see annex 3.

Because of the continuing problem of excedent production in the EC, the EC made an adaption to the system of guaranteed prices. The farmers and factories have to pay a 'production contribution' for A- and B-sugar. So in effect the guaranteed price is reduced by the production contribution.

2.3 Beet sugar price in the Netherlands

Each country is allowed to design its own system for the application of the EC rules regarding the production and prices of sugar. In the Netherlands there is a system of mixed prices. This means that there is an average price for sugarbeets and sugar, based on the guaranteed price and quantity of A-sugar, B-sugar, and also for a small part of the C-sugar.

The EC sugar policy results in the following price structure for 100 kg. white beet sugar (prices of 1993, in DFL):

costs of sugarbeet	86.00
processing margin of sugar factory (including a storage levy of 6,63)	57.50
production levies (av. 10% for the factory)	16.00
<hr/>	<hr/>
sugar price (off factory)	160.00
+ carriage costs	3.50
+ TVA (6%)	9.81
<hr/>	<hr/>
	173.31

Source: Suikerunie, dhr. Mutsaers

Notes:

- 1. The sugar price (off factory) is a global price, given by the Suikerunie. This price is for bulk purchase (delivery in shipments of 30 ton). The buyer needs to have his own silo for storage. Minimal purchase is more than 100 tonnes per year.*
- 2. The consumers price for sugar is f 195.0 for 100 kilo. Results that the margin for shopkeepers is only 195.0 minus 173.31 is 21.69. This is 11%, a low margin compared to the standard average of 25%. This is probably due to the fact that sugar is a basic product, and margins for basic products are usually lower than for other products.*

The price of f 160,- / 100 kg.'s is the market price. The EC fixes every season a so called 'intervention price'. This is the price the sugar factories receive from the EC, in case they can't sell their sugar at the market (for a reasonable price). So in fact the intervention price is a minimum price. The intervention prices for the 1992/93 season are (Produktschap Akkerbouwprodukten):

- for white sugar: f 140.61
- for raw sugar: f 116.55

In the Netherlands there is no production of organic beet sugar. This is according to dhr. Mutsaers from the Suikerunie due to the technical structure of sugar processing. Sugar beets have a passage in the factory of two days, so there is a large minimal amount of organic sugar beets required for an efficient production.

2.4 Cane sugar imports and prices in the EC

As already explained there is a distinction between sugar imported from ACP countries and sugar that is imported from non-ACP countries. The ACP countries receive a guaranteed price for a limited amount of sugar (the so called ACP-quota). For an overview of the allocation of the ACP-

quota see annex 4. For sugar imports from non-ACP countries the EC demands an import levy. This levy is so high, that no sugar from non-ACP countries is imported in the EC. So the total sugar import in the EC equals the ~~the~~ amount of ACP-quota, which is about 1.3 million tonnes. About 90% of the sugar imported from the ACP countries is raw sugar, i.e. sugar that needs* further refinement. About 80% to 90% of this raw sugar is refined in England by Tate & Lyle, the other part is refined in France and Portugal. In case the refined cane sugar cannot be sold at the European market, the EC also offers export refunds for it. However, exports of ACP-sugar are very limited, because the largest part of the sugar processed by Tate & Lyle is used for consumption in England. Tate & Lyle exports about 100.000 to 200.000 tonnes of cane sugar a year, about 8 to 15% of all ACP-sugar (commission EC, van Empl).

UK 85% consumption of ACP sugar

cane sugar price for ACP imports

Every season the EC determines the guaranteed (c.i.f.) price for ACP-sugar. This guaranteed price equals or almost equals the intervention price in the EC. For the 1992/93 season the guaranteed prices are (in DFL; commission EC, dhr. van Empl):

- for white sugar: 143.82
- for raw sugar: 116.55

Raw sugar is refined in Europe, and sold at the European market price. For white sugar has to be payed toll and taxes at the border, and carriage costs and TVA. This results in a price for white ACP sugar more or less equal to the market price of European sugar (f 160,- / 100 kg.'s).

cane sugar price for non-ACP imports

For the import of sugar from non-ACP countries must be payed an import levy. This levy is fixed daily according to the difference between the 'threshold price' and the world market price. The threshold price is fixed by the EC every season, and the import levy is fixed daily because of the daily fluctuations in the world market price. In 1993 the prices are (price in DFL per 100 kg.'s; commission EC, dhr. van Schandewijl):

threshold price	- white sugar	169.50
	- raw sugar	144.83
world market price	- white sugar	56.15
(11 jan.1993)	- raw sugar	41.06
import levy	- white sugar	122.02
(12 jan.1993)	- raw sugar	104.93

The fixed import levy is to be payed for every amount of sugar imported from outside the ACP countries, independent of the price paid to the producers. So in case a 'fair' price is paid to the producers, i.e. a price higher than the world market price, the same import levy must be payed as

for sugar bought against the world market price. This means that the import price under fair trade conditions will be a lot higher than the EC threshold price, and then also the toll and taxes at the border must be paid, and the carriage costs and TVA.

The influence of cane sugar import on European trade

Although the amount of sugar that would be imported by Max Havelaar for the production of chocolate will be very small (about 500 tonnes), we will discuss the mechanism of the influence of sugar imports on European trade. In doing so, we have to make a distinction between sugar imports from ACP countries and from non-ACP countries. If sugar is imported from an ACP country there will be no effect on European trade, since ACP sugar imports are limited to the amount of the allocated quatum. If sugar is imported from a non-ACP country and consumed within the EC, there will be less consumption of EC- and ACP- quatum sugar, and hence more export of quatum sugar.

2.5 Quality criteria for sugar in European trade

The EC has established quality criteria for white sugar. These criteria are valid for beet sugar as well as for cane sugar, since after refining they cannot be distinguished. The EC distinguishes four qualities, based on the following criteria (Zuckerwirtschaft):

1. Polarisation (pureness)
2. Polarisation-ash (shape of the crystal)
3. Humidity
4. Invert sugar
5. Colour type
6. Colour in solution

Sugar of EC-2 quality is the so called 'standard quality', the EC bases its sugar prices on this quality. In the regular trade virtually only sugar of EC-1 and EC-2 quality is traded. The EC-3 quality has the same degree of polarisation (more than 99.7%) as the first and second quality, but differs with regard to the other criteria. The fourth quality, the so called 'plantation white sugar', is not traded in the regular trade. The degree of polarisation is 99.5% to 99.7%.

The EC has not determined quality criteria for raw sugar. For trade in raw sugar international trade regulations are used. Based on these regulations there is paid an extra allowance or levied a discount. The criterium for extra allowances or discounts is the degree of polarisation. Raw sugar is defined as sugar with a polarisation of less than 99.5%, the standard quality raw sugar has a polarisation of 96%. So above this 96% an extra allowance is paid, and below the 96% a discount is charged.

3. CANE SUGAR PRODUCTION AND PRODUCERS

3.1 Organization of sugar cane production

In the sugar cane production we can make a distinction between two basic forms of organisation, production on plantations and production by small farmers. In the (recent) past plantations were often owned by foreign companies like Tate & Lyle. In the last decade most of the foreign companies have sold the ownership of the plantations to local companies or governments, but often stayed in charge of the management. So the risk of production is transferred to local government or companies. Usually a share or the total supply of sugar cane for the factories is supplied by independent farmers, the so called 'outgrowers'. The importance of outgrowers in cane supply is increasing, i.e. a transfer of the risk of production to independent farmers. Part of these independent farmers will be smallholders, although it is known that many smallholders produce non refined traditionally processed 'sugar' (via the so called 'Open Pan non-centrifugal processing method', see paragraph 3.3), that is sold at the local market. In annex 5 we present the importance of smallholders in cane supply in 1981.

There has always been a great variety in forms of organization in third world countries. Kaplinsky (1989) distinguishes the following categories:

total integration: Mill-owned plantations supply the full cane requirements of the mill. Examples of this form can be found mostly in African countries, eg. Zambia, Zimbabwe, Malawi, Swaziland, Ethiopia, Sudan and Mauritius.

partial integration: Mill-owned plantations supply a portion of the cane requirements, the balance being supplied by contract 'outgrowers'. Brazil, Argentina, Columbia, Dominican Republic, Honduras, and Kenya have such forms of organisation. And some of the countries classified under 'total integration' also know this form of production (Zambia, Swaziland and Malawi; Bitterzoete oogst, 1987).

total seperation: This is most common in Asia. India, Pakistan, Thailand, Philippines and Indonesia, for example have no plantations. Mexico, similarly, has no plantations. South and South East Asia are, in fact, the regions where smallholder cane cultivation as part of a mixed crop rotation system is longest established. Mills, therefore, have to secure their cane supply form either a multitude of smallholdings (as in India and Indonesia) or from a mixed group of large and small independent farms (such as those in the Philippines and Thailand).

3.2 Sugar cane yields

Sugar cane yields vary widely throughout the world, due to differences in climate, cane variety, soil quality, fertilization, irrigation, plant diseases, extension and socio-economic variables. Yields of small farm production are usually lower than plantation yields. However, this is not always the case, since theoretically a small farmer can produce as efficient as a large plantation. For an overview of average yields per country we use statistics out of the FAO Yearbook (table 6). Next

we present some data on small farm production, personally collected by ir. J.P. Thijssse in several countries (table 7). He warns for manipulation of official statistics, for political or commercial reasons. He himself found differences from official data up to 50%.

Table 6 Average yields in 1988 (tonnes/hectare)

Brasil	62,7
Argentina	55,0*
Colombia	72,2
Mexico	90,2
Dominican Republic	55,1*
Cuba	56,8
Indonesia	84,4*
India	59,9
Pakistan	42,3
Bangladesh	42,2*
Philippines	58,0
Thailand	47,7
China	52,7
Other developing	58,6*
Australia	83,9

*: 1985

Source: *FAO Yearbook*

Table 7 Average yields on small farms (tonnes/hectare)

Burma	37,5
Indonesia	60 - 100 ⁽¹⁾
Belize	35 ⁽²⁾
Laos	30 ⁽³⁾
China	44 - 148 ⁽¹⁾
Pakistan	37
Bangladesh	37

(1) the difference in yields is due to the availability of irrigation water.

(2) also yields of 50 tonnes/hectare were noted.

(3) there was noted a variation of 23 to 40 tonnes/hectare.

Source: *ir. J.P. Thijssse*

According to the consultancy agency HVA, yields of small farmers are on the average at least 100 tonnes of sugar cane per hectare. This high average yield is due to the fact that HVA has worked with sugar projects that use irrigation for the production of cane. So, an important determinant for sugar cane yield is the availability of irrigation water, as is also shown in table 7. Another important determinant for sugar cane yield is the soil quality. In general smallholders that produce non refined sugar for the local market own low quality soils, and will have low cane yields. In case of (cooperative) sugar production for a processing factory, it seems likely to presume that

yields will be higher than the yields of smallholders producing for the local market, because a sugar factory will pose certain quality and quantity demands to the sugar cane producers. Finally we must be aware of the great variety in growth season of sugar cane. The length of the growth period of sugar cane can vary from 12 up to 18 months. In general for commercial growing the cropping system is managed in such a way that there is a harvest every year.

According to the large variation in yields, it is impossible to calculate a general average cane yield of small farm production. In the following, wherever it is necessary to use an average for cane yields, I will use the average of 50 tonnes/hectare. But we must keep in mind the great variety in yields!

3.3 Sugar yield of sugar cane

(Source: Appropriate industrial technology for sugar, UN, 1980)

The sugar yield of sugar cane largely depends on the processing method that is used. There can be distinguished three basic cane processing techniques, which are briefly described below.

1. Open Pan non-centrifugal

The sugar cane is crushed. Small-scale crushers use animal power, larger-scale crushers use electric or gasoil power. The juice is heated in open pans, and clarified with vegetable 'clarificants'. Sometimes chemical clarificants are used. The remaining juice is transferred to a cooling pan, and stirred. The product of this type of processing is a dense mass of a light to dark-brown colour, the so called non refined cane sugar, that contains less saccharose than refined sugar and more of the natural elements of the sugar cane. Because of these 'impurities' this sugar is generally regarded as unfit for industrial food processing.

The sugar yield (including the 'impurities') varies from 8 to 12%.

2. Open Pan centrifugal

The difference of this processing method with the non-centrifugal method is that the cane juice is purified by lime sulphitation, then heated in open pans, and discharged to crystallizers fitted with a stirring device. The product of this type of processing is refined sugar, that approaches the quality of 'plantation white sugar' (the category EEG-4). The sugar yield averages about 7% in case of the use of chemical clarificants, and 6% in case of the use of vegetable clarificants.

3. Vacuum Pan centrifugal

This processing method is used in the large scale processing units. But it is also known to be used on smaller scales. The main difference with the previous methods is the use of vacuum pans instead of open pans. The main advantages of the use of vacuum pans is the reduced fuel consumption and the higher sugar yield. The product of this processing method is refined white sugar (depending on the details of the production process the quality of the refined sugar varies) or raw sugar (that needs further refinement). The sugar yield is about 10%, with a maximum of

about 11,5% (article in Zuckerindustrie, 1990).

3.4 Small-scale processing of sugar cane

As to be expected the scale of processing is related to the processing method that is used. The general trend all over the world is the consolidation of processing facilities into fewer and larger units. Still, plant size varies widely from one country to another and even in the same country. Data on the so called Open Pan processing methods are hardly available. Virtually all reports on the Open Pan method relate directly to or are inspired by experience in India. So the data presented here are based on the Indian situation (source: Appropriate industrial technology for sugar, UN, 1980).

Minimal processing capacity:

1. Open Pan non-centrifugal⁽¹⁾: 3 to 5 tonnes sugar cane per day.
(non refined sugar)
2. Open Pan centrifugal: 5 tonnes sugar cane per day
(refined sugar) (capacities can vary up to 300 tonnes sugar cane per day).
3. Vacuum Pan centrifugal: 1,250 tonnes sugar cane per day
(refined sugar) (with a variation form 1,250 to 6,000 tonnes sugar cane per day, the average is \pm 1,800 tonnes sugar cane per day).

(1) As a comparison: the Alter Trade mill on the Philippines, that produces non refined sugar, has a capacity of 21,9 to 26,3 tonnes sugar cane per day. The mill is working during 6 months a year.

More recent data on the Vacuum Pan processing method show a larger diversion in processing capacity. In annex 6 we present an overview of cane sugar factories (Vacuum Pan) with capacities of less than 1,000 tonnes of cane per day. Some of the factories listed are known to be of recent vintage. (This could be an indication of the economic viability of these kind of small scale factories.) For example, the Sierra Leone mill with a capacity of 400 tonnes sugar cane per day started production in 1981. Two factories in Burma with capacities of 350 tonnes, built by the Dutch firm Stork-Werkspoor, started in 1984. In 1986/87 the Danish company De Danske Sukkerfabrikker (DDS) built a factory in Deshbandhu, Bangladesh, with a capacity of 300 tonnes. An older factory is found in Mali, the Dougabougou factory, built in 1966 with a capacity of 400 tonnes. All of these factories are active in the so called 'formal' sector of the world sugar industry, i.e. factories individually listed in international directories or reported in the technical press (Kaplinsky, 1989).

3.5 Sugar production for Gabriela chocolate

It is to be expected that for the production of Gabriela chocolate will be needed about 500 tonnes of white sugar. In compliance with the data presented in this chapter, we will make an estimate of the number of farmers that can supply this amount of sugar. We will make the estimate for the suppliance of white sugar, processed by the Vacuum Pan method. And also for the suppliance of plantation white sugar, processed by the Open Pan centrifugal method. The latter estimate is included, because it could be that chocolate factories can also use the plantation white sugar for the production of chocolate.

white sugar

For the production of 500 tonnes white sugar is needed 5,000 tonnes sugar cane (sugar yield of 10%). With an average cane yield of 50 tonnes/ha, this means a need of 100 hectares grown with sugar cane.

In general small farmers grow sugar cane besides other crops, so about 1 to 1.5 hectares is grown with sugar cane. Also, in case of contract farming for a sugar factory it's common that farmers have a contract for 1 to 1.5 hectares of sugar cane. This would mean that about 67 to 100 small farmers can provide the amount of sugar required for the production of Gabriela chocolate. Gabriela chocolate will be produced under the conditions of Max Havelaar, which means that 25% of the farmers sugar cane production will be bought by Max Havelaar. In that case the number of farmers providing the sugar cane will be about 268 to 400.

As we know the processing of white sugar has rather high minimum processing capacities. So this will be a complicating factor in the purchase of such a small amount of sugar as required by Max Havelaar.

plantation white sugar

For the production of 500 tonnes plantation white sugar is needed 7,143 tonnes of sugar cane (sugar yield of 7%). With an average cane yield of 50 tonnes/ha this means a need of 143 hectares grown with sugar cane.

Using again the 1 to 1.5 hectares per farmer, this would mean that about 95 to 143 small farmers can provide the amount of sugar required for the production of Gabriela chocolate. In case 25% of the farmers sugar cane production will be bought by Max Havelaar it would mean that the number of farmers providing the sugar cane will be about 380 to 572.

Note: In case small farmers grow sugar cane using irrigation water, yields will be much higher. This would mean a considerable reduction in the number of farmers that can supply the amount of sugar cane required by Max Havelaar.

3.6 Known sugar cooperatives in third world countries

Due to the dominant form of organisation of cane sugar production, characterized by large scale processing factories, it will be hard to find any cooperative forms of production. However, it is also indicated in the former that there is a lot of small scale production of sugar cane, and that there are at least technical possibilities for processing on a smaller scale. Still, there is little information on sugar producing cooperatives, so there is only a limited amount of examples presented here below.

The best known example of a sugar cooperative is Alter Trade at Negros, Philippines. The sugar from Alter Trade is used for the production of the Mascao chocolate, sold by the SOS-Wereldhandel. Actually Alter Trade isn't a real cooperative, but an alternative trade organisation that offers a fair price to sugar cane producers. Alter Trade processes the cane into non refined sugar. Alter Trade owns one mill, that has a processing capacity of about 22 to 26 tonnes sugar cane a day. The mill functions 6 months a year, and in this period produces about 400 tonnes unrefined sugar.

The SOS-Wereldhandel recently has established a contact with a sugar cooperative in Costa Rica. Because it's a very recent contact, there is still little known about the functioning of the cooperative. But according to the SOS it is a cooperative of middle to large farmers, so SOS is seeking for another cooperative, one of small farmers.

Oxfam recently has established a contact in Nicaragua. The sugar bought there is meant to be used for the production of sesame cookies, and some other processed products that are in development. The Nicaraguan sugar factory is a former state-enterprise that now is organised via a system of total workers participation. Involved in the initiative are the ATC (The Union of Agricultural Labourers) and CIPRES (an NGO). CIPRES wants to start an alternative trade organisation in Nicaragua, and regards this sugar initiative as a starting point. The main problems for Oxfam regarding the sugar sales are:

1. The small amount of sugar purchased by Oxfam, which means it is not such an interesting trading partner for the Nicaraguan factory.
2. The price asked by the Nicaraguan sugar factory is regarded as a relatively high price by Oxfam. The Nicaraguan factory asks a price of f 81.- per 100 kilo, while the world market price is between f 34.- and f47.- per 100 kilo.

The Dutch co-financing organisation HIVOS has contacts with an association of sugar cane producers in Grenada. However, the cane production of these small farmers is destined for the production of rum. So all of the sugar is sold to rum producing factories.

To find out more about the existence of sugar cooperatives, we could use the worldwide networks of the Dutch organisation Paolo Freire and the organisation Friends of the Earth.

4. ECOLOGICAL ASPECTS OF SUGAR PRODUCTION

Data with regard to the energy consumption of sugar production are hardly or not available. Especially the data concerning cane sugar production must be regarded as rough estimates. Not included in the calculations are the energetic balances for the rest products of sugar production, i.e. animal fodder out of beet pulp and cane melasse. Neither the mineral nor nutrient balance of the soil is taken into account. This could change the outcome of the comparison made here below.

The estimates for the energy consumption of beet and cane sugar are both based on the production of white refined sugar, processed via the Vacuum Pan method.

4.1 Beet sugar

(source: NOVEM report)

inputs	kg/ha	energy/ha(kJ)
N	160	10.4×10^6
P ₂₀₅	70	1.1×10^6
K ₂₀	106	0.9×10^6
crop protection		2.5×10^6
total beet production		14.9×10^6
beet yield:	58.2 tonnes/ha	
sugar yield:	15%	
sugar yield/ha:	8.73 tonnes/ha	
100 kg's sugar uses $1/87.3 \times (14.9 \times 10^6) =$		170,676 kJ
100 kg's sugar uses for processing (CSM)		585,760 kJ
total energy consumption of 100 kg's beet sugar		756,436 kJ

4.2 Cane sugar

(source: consultancy agency HVA)

inputs	kg/ha	energy/ha(kJ)
N	50	3.25×10^6
crop protection		0.5×10^6
total cane production		3.75×10^6
cane yield:	50 tonnes/ha	
sugar yield:	10%	
sugar yield/ha:	5 tonnes/ha	
100 kg's sugar uses $1/50 \times (3.75 \times 10^6) =$		75,000 kJ
100 kg's sugar uses for processing ⁽¹⁾		63,000 kJ
total energy consumption of 100 kg's cane sugar		138,000 kJ

(1) For cane sugar processing the fibres of the stalks are used as fuel, so fuel consumption of a cane sugar factory is zero. In modern plants there can be some use of electric energy of 15 - 20 kWh/ton cane (article Zuckerindustrie). So in the calculation we have taken as energy consumption of processing 17.5 kWh/ton cane.

cane sugar transport (based on information of the Maritiem informatie-centrum and the Binas-tabellenboek)

The cane sugar must be transported to Europe, and this will also cost some energy. To make the calculation, we have taken as an example the route Tanzania - the Netherlands.

distance: - via the Suez Canal: 6415 miles
 - via the Cape: 8520 miles

By transportation in a 14,000 tonnes ship (sugar in bags of 50 kg's) 100 kg's sugar uses:

- via the Suez Canal: 97,200 kJ
- via the Cape: 133,200 kJ

By transportation in a 500 tonnes ship (sugar in bags of 50 kg's) 100 kg's sugar uses:

- via the Suez Canal: 745,200 kJ
- via the Cape: 972,000 kJ

Transportation in a 500 tonnes ship is rather a hypothetical calculation, since these kind of ships do not sale at such large routes. However the calculation shows that use of energy in transport could be a factor of significance in the energy balance.

4.3 Energy use for beet or cane sugar

Production of beet sugar consumes in energy 756,436 kJ. Whereas production and transport of cane sugar totals 235,200 kJ to 271,200 kJ. Although the method of calculation is open to debate (as mentioned above), the preliminary conclusion is that for production of cane sugar about 3 times less energy is needed than for production of beet sugar.

Note: In case cane sugar is processed by an Open Pan method, there is needed extra fuel in addition to the cane stalks. So in this case the comparison of energy use for beet or cane sugar production will be less favourite for cane sugar.

ANNEX 1

Distribution of the A and B quota for white sugar and HFCS among the EC countries

(Source: *Zuckerwirtschaft 1992/93*)

Allocation of basic quantities of white sugar in the EC:

Member States	Basic quantities 1992/93		Sugar production
	A-quota t	B-quota t	1991/92p t
Germany ¹	2,637,703.0	811,609.9	3,905,109
France	2,996,000.0	805,832.8	4,318,793
(share of DOM)	436,000.0 ²	46,600.0	250,000)
Italy	1,320,000.0	248,250.0	1,509,000
Netherlands	690,000.0	182,000.0	1,046,000
Belgium/Luxembourg	680,000.0	146,000.0	890,435
United Kingdom	1,040,000.0	104,000.0	1,219,623
Denmark	328,000.0	96,629.3	468,000
Ireland	182,000.0	18,200.0	213,204
Greece	290,000.0	29,000.0	273,000
EEC-10	10,163,703.0	2,441,522.0	13,843,164
Spain	960,000.0	40,000.0	940,895
Portugal	63,636.4	6,363.6	1,200
(share of Azores)	9,090.9	909.1	1,050)
EEC-12	11,187,339.4	2,487,885.6	14,785,259

p = preliminary

¹ Including former GDR; basic quantities 1992/93: A-quota 647,703 t, B-quota 199,297 t.

² According to Regulation (EEC) No. 1785/81 the A-quota of the DOM amounts to 466,000 t, of which France has the right to carry over 30,000 t to the mainland A-quota and has done so since 1981/82.

Allocation of basic quantities of isoglucose in the EC:

Member States	Basic quantities 1992/93		Isoglucose production
	A-quota t	B-quota t	1991/92p t
Germany	28,882.0	6,802.0	34,495.9
France	15,887.0	4,135.0	19,925.8
Italy	16,569.0	3,902.0	20,438.8
Netherlands	7,426.0	1,749.0	9,133.8
Belgium/Luxembourg	56,667.0	15,583.0	71,668.2
United Kingdom	21,696.0	5,787.0	27,432.4
Denmark	-	-	-
Ireland	-	-	-
Greece	10,522.0	2,478.0	12,334.2
EEC-10	157,649.0	40,436.0	195,429.1
Spain	75,000.0	8,000.0	82,998.6
Portugal	8,093.9	1,906.1	6,609.1
EEC-12	240,742.9	50,342.1	285,036.8

ANNEX 2

Companies owned by Tate & Lyle in 1992

(Source: Who owns whom, 1992)

TATE & LYLE PLC, Sugar Quay, Lower Thames		6711, 2062,
Street, London, EC3R 6DQ Tel: 071-626 6525		5149, 5199,
		2083
Certibilt Investments Ltd.		
Kaba (A)	Hungary	
Rumenco Ltd. (d)		
Adco Ltd. (d) (A)		
A.V. Matlock Ltd. (d) (A)		
The Molassine Co. Ltd. (d) (A)		
Rumevite Ltd. (d) (A)		
United Molasses Purchasing Ltd. (d) (A)		
Tate & Lyle Australia Pty. Ltd.	Australia	
Bundaberg Sugar Co. Ltd.	Australia	
Babina Sugar Ltd.	Australia	
Bundaberg Distilling Co. Pty. Ltd. (A)	Australia	
Bundaberg Molasses Co. Ltd.	Australia	
Croydon Pastoral Co. Pty. Ltd.	Australia	
Environmental Enterprises Australia Ltd.	Australia	
Gibson & Howes Pty. Ltd.	Australia	
Gin Gin Sugar Co. Pty. Ltd.	Australia	
Hardings Manufactures Pty. Ltd.	Australia	
Millaquin Sugar Co. Pty. Ltd.	Australia	
Moreton Sugar Co. Ltd.	Australia	
Westfalen Colliery Pty. Ltd.	Australia	
Bundaberg Foundry Engineers Ltd.	Australia	
McQueen Holding & Investment Co. Pty. Ltd.	Australia	
Wm. McQueen & Co. Pty. Ltd.	Australia	
Tate & Lyle Industries Ltd.		
Hallamoil Ltd. (d)		
UniTank Developments Ltd. (d)		
Tate & Lyle International Finance PLC		
Tate & Lyle Investments Ltd.		
Alcantara Soc. de Empreendimentos	Portugal	
Acucareiros S.A.R.L.		
Refinadores de Santa Iria S.A.R.L., Soc. de	Portugal	
Athei Reinsurance Co. Ltd.		
Biolinol Futterfette Produktions GmbH (A)	Germany	
Harvey Steel Sugars Ltd.		
Hippo Valley Estates Ltd. (A)	Zimbabwe	
The Howden Glucose Co. Ltd. (d)		
The Molasses Trading Co. Ltd.		
Canada West Indies Molasses Co. Ltd.	Canada	
110833 Canada Ltd. (d)	Canada	
Caribbean Antilles Molasses Co. Ltd.	Barbados	
Caribbean Molasses Co. Ltd.	Guyana	
Caribbean Bulk Storage & Trading Co. Ltd.	Trinidad and Tobago	
East African Storage Co. Ltd.	Kenya	
Européenne de Mélasses S.A., Sté. (SEM)	France	
Exportadora de Melacos Ltda., Cia.	Mozambique	
Fraternitas Ltd. (A)	Kenya	
Hansa Melasse Handelsgesellschaft mbH	Germany	
The Mauritius Molasses Co. Ltd.	Mauritius	
Melassa Italiana (Melitalia) S.p.A.	Italy	
Nordisk Melasse A/S	Denmark	
Melasco A/S (d) (A)	Denmark	
Premier Molasses Ltd. (A)	Republic of Ireland	
The Pure Cane Molasses Co. (Durban) (Pty.) Ltd.	South Africa	
Somalia Molasses Co. Ltd. (A)	Somalia	
Tameco N.V.	Belgium	
Tankers Ltd. (d)		
Tanzania Liquids Storage Co. Ltd. (A)	Tanzania	
Tate & Lyle Commodities (Far East) Ltd.	Hong Kong	
United Molasses (Ireland) Ltd. (A)		
United Molasses Sudan Ltd.	Sudan	
Nazestar Ltd. (d)		
Redpath Industries Ltd.	Canada	
Richards (Shipbuilders) Ltd.		
Tate & Lyle Cane Cultivations Ltd.		
Athei Line Ltd. (d)		
Atheiduchess Tankers Co. Ltd. (d)		
Atheiduke Tankers Co. Ltd. (d)		
Athelempress Tankers Co. Ltd. (d)		
Atheiking Tankers Co. Ltd. (d)		
Atheiknight Tankers Co. Ltd. (d)		
Atheiprincess Tankers Co. Ltd. (d)		
Atheiqueen Tankers Co. Ltd. (d)		
Atheiregent Tankers Co. Ltd. (d)		
Atheisceptre Tankers Co. Ltd. (d)		
Atheisovereign Tankers Co. Ltd. (d)		
Atheitemplar Tankers Co. Ltd. (d)		
Blackwall Gases Ltd. (d)		
The British Molasses Co. Ltd. (d)		
Clyde Wharf Ltd. (d)		
Duttson & Knight Ltd. (d)		
Fowler Ltd. (d)		
Garton Sons & Co. Ltd. (d)		
Huskisson Transit Co. Ltd. (d)		
Kentships Ltd. (d)		
The Liverpool Flake Co. Ltd. (d)		
M. & G. Group Engineering Co. Ltd. (d)		
McIntyre Ltd. (d)		
R. & R. McLeod & Co. Ltd. (d)		
Manbre & Garton Trading Ltd. (d)		
Manbre Sugars Ltd. (d)		
Paget & King Ltd. (d)		
Primrose Wharf Ltd. (d)		
The Pure Cane Molasses Co. Ltd. (d)		
Scottish Distributors Ltd. (d)		
Silvertown Services Lighterage Ltd. (d)		
Sugar Line Ltd. (d)		
Sugar Line Shipping Ltd.		
Sugar Line Terminals Ltd. (d)		
Taif Ltd. (d)		
Tate & Lyle Farms Ltd. (d)		
Tate & Lyle Greenwich Ltd. (d)		
Tate & Lyle Parcel Tankers Ltd. (d)		
Tate & Lyle Pulses Ltd. (d)		
Tate & Lyle Refineries Ltd. (d)		
Tate & Lyle Services (UK) Ltd. (d)		
Tate & Lyle Trading Co. Ltd. (d)		
Tate & Lyle Uxbridge Ltd. (d)		
Unit Loads Ltd. (d)		
United Oils & Fats Co. Ltd. (d)		
Valentin, Ord & Nagei Ltd. (d)		
The Westburn Sugar Refineries Ltd. (d)		
Tate & Lyle Developments N.V.	Netherlands	
Tate & Lyle Commodities Ltd.	Bermuda	
Tate & Lyle Finance (Jersey) Ltd. (d)	Jersey	
Tate & Lyle Futures Ltd. (d)		
Tate & Lyle Group Services Ltd.		
Farm Feed Holdings Ltd. (d)		
Farm Feed Formulators (Commodities) Ltd. (d)		
Farm Feed Formulators Ltd. (d)		
Four-F International Ltd. (d)		
Micronized Food Products Ltd. (d)		
Milltech Ltd. (d)		
Northline Transport Ltd. (d)		
Pig Pac Ltd. (d)		
Sergeant Seeds Ltd. (d)		
Greenock Bulk Handling Co. Ltd. (d)		
Manbre & Garton Ltd. (d)		
South Cambridgeshire Seed Co. Ltd. (d)		
Talres Development Ltd. (d)		
Tate & Lyle Agribusiness Ltd. (d)		
British Charcoals & Macdonalds Ltd. (d)		
Farrow Irrigation Ltd. (d)		
A. & W. Smith & Co. Ltd. (d)		
Foundry Plant & Machinery Ltd. (d)		
The Mirrlees Watson Co. Ltd. (d)		
R.G. Ross & Sons Ltd. (d)		
Tate & Lyle Process Technology Ltd. (d)		
Tate & Lyle Feeds Ltd. (d)		
Tate & Lyle Shipping Ltd. (d)		
Anco Tanker Service Ltd. (d)		
Anco Tanker Service A/S (d)	Norway	
Tate & Lyle Trading & Developments Ltd. (d)		
Tate & Lyle Transport Ltd. (d)		
Tate & Lyle Operations Ltd. (d)		
Tecomatic Ltd. (d)		
Turnload Ltd.		
Tate & Lyle Holland B.V.	Netherlands	
Amylum N.V. (A)	Belgium	
Nederlandsche Melasses Handel Mij. B.V.	Netherlands	
Schouten Beheer B.V.	Netherlands	
Talres Development B.V.	Netherlands	
Tate & Lyle Management & Finance Ltd.	Bermuda	
Tate & Lyle (Norve) A/S	Norway	
C.H. Isachsen & Co. A/S	Norway	
Tate & Lyle (Portugal) Importação e Exportação Ltda.	Portugal	
Tate & Lyle Reinsurance Ltd.	Bermuda	

Tate & Lyle Technical Services Ltd. (d)	
United Alcohol Co. S.A.C.I.F. (d)	Argentina
ZSR Ltd.	Zimbabwe
Gilletti (Pvt.) Ltd. (d)	Zimbabwe
Grant Chemicals (Pvt.) Ltd. (d)	Zimbabwe
T.J. Heyes (Pvt.) Ltd. (d)	Zimbabwe
Polyfilm (Pvt.) Ltd. (d)	Zimbabwe
Sugar Distributors (Pvt.) Ltd. (d)	Zimbabwe
Zambia Sugar Co. Ltd. (A)	Zambia
Tate & Lyle Holdings Ltd.	
Tate & Lyle do Brasil Ltda.	Brazil
Tate & Lyle Inc.	U.S.A.
Amstar Sugar Corp.	U.S.A.
Pacific Molasses Co.	U.S.A.
Commercial Molasses Corp. (d)	U.S.A.
Pacific Molasses Export Co.	U.S.A.
Pacific Molasses Ltd.	Canada
Pacific Molasses Transport Co.	U.S.A.
Pacifico Mercantil S.A. (Inc.) (d)	Mexico
United Molasses Co. of America Inc. (d)	U.S.A.
Vigortone Products Inc.	U.S.A.
Staley Holdings Inc.	U.S.A.
A.E. Staley Manufacturing Co.	U.S.A.
Agroindustrias La Sierra S.A. (A)	Uruguay
Almidones Mexicanos S.A.	Mexico
Coso Trading-Anstalt (d)	Liechtenstein
Ging Inc.	U.S.A.
Kunstharze GmbH	Germany
Livergood Grain Co.	U.S.A.
Midwest Processing Co. (A)	U.S.A.
Ocean Products Ltd. (d)	Cayman Islands
Participaciones Occidentales S.A.	U.S.A.
Ltd. (d)	
Pequera San Pedro S.A.C.I., Cia. (A)	Chile
A.E. Staley Manufacturing international Co. (d)	U.S.A.
Staley (Canada) Ltd.	Canada
Staley Engineering Inc. (d)	U.S.A.
Staley Export Ltd.	Cayman Islands
Staley Foreign Sales Corp. (d)	Virgin Islands (U.S.A.)
Staley International Inc. (d)	U.S.A.
Staley Ltd. (d)	U.S.A.
Staley Securities Inc.	U.S.A.
Staley Techventures Co.	U.S.A.
Staley Trading Co.	U.S.A.
Stapol S.A.	Switzerland
Tapioca Development Corp. Ltd. (A)	Virgin Islands (U.S.A.)
Target Coal Co. (d)	U.S.A.
Talres Development Inc.	U.S.A.
Western Sugar Co.	U.S.A.
Technostaal Schouten Inc.	U.S.A.
Tunnel Refineries Ltd. (A)	U.S.A.

ANNEX 3

Distribution of the EC beet sugar quota among the sugar factories until 1990 (in tonnes white sugar)

Member state	Quota	Company	share in %
France	A 2,530,000	Beghin-Say (Ferruzzi)	32%
	B 759,232.8	Sucre Union	11%
		France Sucre	9%
		General Sucriere	8%
		Others (30)	40%
West Germany	A 1,990,000	Sudzucker	21%
	B 612,312.8	Frankenzucker	19%
		Pfeifer & Lange	13%
		Others (19)	47%
Italy	A 1,320,000	Eridiana (Ferruzzi)	37%
	B 248,250	ISI (Ferruzzi)	11%
		Others (14)	52%
England	A 1,040,000	British Sugar	100%
	B 104,000		
Spain	A 1,000,000	Campo Ebro	28%
		CIA	26%
Netherlands	A 690,000	Suikerunie	63%
	B 182,000	CSM	37%
Belgium	A 680,000	Tiense Suikerraff.	71%
	B 146,000	Moerbeke	9%
		Frasmes	8%
		Others	12%
Denmark	A 328,000	DDS	100%
	B 96,629.3		
Greece	A 290,000	1 company	100%
	B 29,000		
Ireland	A 182,000	1 company	100%
	B 18,200		
Portugal	A 80,000	Acucar reunidas	100%

Source: EC, *Financieel Dagblad* 5-8-87. From W. Polder en R. Stellinga, 1989

ANNEX 5

Importance of smallholders in cane supply (1981)

(Source: Kaplinsky, 1989)

Country	% of Cane production
CENTRAL AMERICA AND THE CARIBBEAN	
Costa Rica	most
Dominican Republic	23
El Salvador	65
Haiti	50
Honduras	30
Jamaica	40
Mexico	most
SOUTH AMERICA	
Argentina	45
Bolivia	90
Brazil	54
Colombia	60
Ecuador	10
Paraguay	95
Peru	20
Venezuela	70
AFRICA	
Egypt	most
Kenya	most
Mauritius	42
South Africa	30
ASIA	
Bangladesh	most
India	most
Indonesia	most
Pakistan	most
Nepal	most
Thailand	70

Source: Chilvers and Foster, 1981.

ANNEX 6

Cane sugar factories in the 'formal sector' with capacities of less than 1,000 tonnes of cane per day, excluding China

(Source: Kaplinsky, 1989)

Country	Number of factories	Range of capacities
Angola	1	700
Argentina	1	700
Bangladesh	1	300
Burma	4	50-600
Colombia	1	400
Costa Rica	12	300-800
Dominican Republic	1	500
Ecuador	3	150-900
Grenada	1	500
Guatemala	3	50-450
Guinea	1	400
India	35	500-982
Indonesia	1	900
Japan	13	360-950
Mali	1	400
Mexico	4	600-950
Nepal	1	500
Nicaragua	1	600
Pakistan	1	550
Paraguay	4	200-800
Peru	2	300-450
Philippines	1	478
Rwanda	1	150
Sierra Leone	1	400
Spain	3	300-600
Thailand	2	800-850
25 countries	100	50-982

Sources: Lichts, 1981; Lichts, 1986, 113, p.427; International Sugar Organization, 1982, p.31; *Zuckerindustrie*, 1984, 109, p.862; *Zuckerindustrie*, 1987, 112, p.173.

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mills produce raw sugar qualities, but depending on the processing method semi-refined qualities can be obtained. Further refined qualities will need a larger scale to meet capital investment. To ask cooperatives/producer organizations to deliver more refined sugars will be complicated because of this scale problem.

To improve the marketing position of the smaller producer organizations, therefore, it will be indispensable to develop a market for the raw and semi refined sugars, the so-called specialties, which these mills produce.

Medium sized and bigger mills.

Plantation white sugar, a white sugar quality which not has been remelted, is normally processed in medium sized and bigger mills, except in India where it is also produced on a very small scale. Coopeagri in Costa Rica produces this kind of sugar and has an actual capacity of about 125 tonnes of sugar/day, or - producing 5 months - 19.000 tonnes of sugar a year.

The higher quality white cane sugars need remelting and refining. A minimum scale of 300 - 600 tonnes of sugar/day is mentioned, or at least - producing 5 months - 45.000 up to 90.000 tonnes of sugar a year. To compare: The national production of Barbados is about 45.000 tonnes/year; of Madagascar about 90.000 tonnes/year.