Annexes

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Annex A1   Producer Subsidy Equivalents for sugar

		1986-88	1991-93	1996-98	1997p	1998p
A$ mn	Australia	85	67	57	48	42
Ecu mn	**EU**	**2,494**	**2,771**	**1,806**	**1,828**	**1,855**
Y bn	Japan	85	66	58	57	63
US$ mn	US	1,155	1,117	940	942	997
Percentage PSE	Japan	66%	63%	60%	59%	61%
Percentage PSE	**EU**	**53%**	**52%**	**38%**	**36%**	**43%**
Percentage PSE	US	59%	53%	41%	40%	41%
Percentage PSE	Australia	13%	8%	5%	4%	3%
Producer NAC	Japan	3,00	2,73	2,52	2,44	2,58
Producer NAC	**EU**	**2,13**	**2,10**	**1,62**	**1,55**	**1,75**
Producer NAC	US	2,46	2,12	1,69	1,67	1,70
Producer NAC	Australia	1,15	1,09	1,05	1,04	1,04

Source: OECD

Annex A2 Compatibility of EC sugar trade with the GATT Agreement

The WTO-GATT Uruguay Round Agreement on Agriculture (URAA) comprises a vast range of commitments in the areas of market access, export subsidisation and domestic support of agricultural products, including sugar. The URAA covers the period 1995/96 to 2000/01.

The URAA requires a minimum market access at reduced or nil import duties for each agricultural product of 3% of domestic consumption in 1995/96 and 5% in 2000/01. The EC has no problem to fulfil this commitment, because it imports 1,304,700 tonnes of sugar (white sugar equivalents) duty free from the ACP countries and India every year, which is more than 10% of the sugar consumption[1]. Moreover, as a result of the accession of Finland to the EC, the EC is also obliged to import 85,463 tonnes of raw sugar (equivalent to 78,626 tonnes of white sugar) at a reduced import duty. Furthermore, the EC imports 200,000 to 300,000 Special Preferential Sugar at a reduced import duty rate from the ACP states each year. The exact quantity depends on the supply needs of the cane sugar refineries in the EC and the production of sugar cane in the French DOMs. However, these SPS imports are not acknowledged by the WTO as being part of the minimum access requirement.

The URAA also obliges the EC to improve market access by replacing the ad valorem import duties by fixed import duties (done in 1995) and a gradual reduction of the fixed duty by in total 20% between 1995/96 and 2000/01, compared to the average of the years 1986/87 to 1988/89 (the URAA base; see table A2.1)[2]. The EC is allowed to impose an additional import duty when the cif[3] sugar import price is lower than 90% of the trigger price of EUR 531 per tonne (the "Special Safeguard Clause"). The additional import duty is a function of the difference between the trigger price and the world market price. The safeguard clause has been effective since 1995, because of the low world market prices, and has prevented non-preferential sugar imports entering into the EC.

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[1] The EU must import a minimum 630.000 tonnes of sugar (white sugar value) every year, or 5% of consumption of 12.6 million tonnes (CIBE-CEFS; 1998).

[2] See also section 2.3.4.

[3] Cif = cost insurance freight.

Table A2.1   Fixed import duties for sugar

EUR/tonne	Raw sugar for refining	Other raw sugar and white sugar
URAA base	424	524
1995/96	410	507
1996/97	396	490
1997/98	382	473
1998/99	368	456
1999/00	354	439
2000/01	339	419

The URAA imposes also constraints on subsidised sugar exports (exports with refunds). In the year 2000/01 the subsidised quantity has to be 21% lower than in the base period (1986/87-1988/89), while the total subsidy amount has to be 36% lower than in the base period (see also section 2.3.5). The financial outlay for subsidies on agricultural ingredients, including sugar, in food and drinks (non-annex I products) has to be reduced by 36% as well. There is no quantitative limit for non-annex I products. The URAA limits are summarised in table A2.2.

Table A2.2   URAA Export subsidy constraints for the EC

Year	Quantity limit (in tonnes)	Outlay constraint (in million EUR)	
	Sugar "tel quel"	Sugar "tel quel"	Non-annex I
1986/90 (reference period)	1,612,000	779.9	648.4
2000/01	1,273,500	499.1	415.0

The quantity limits for subsidised sugar exports do neither include the export of a quantity of sugar equivalent to the preferential imports from ACP countries, India, Brazil and Cuba, nor sugar exported as food aid (in total about 1.6 million tonnes per year). Thus the total of subsidised exports can be 1.6 million tons higher than the figures mentioned in table A2.2.

The EC made a schedule for reducing the subsidised quantities and the financial outlay in six equal instalments between 1995/86 and 2000/01, but with the possibility to "carry over" from one year to another until the season 1999/00. In the year 2000/01 the reductions of respectively 20% and 31% have to be realised (see table A2.3). Until 1999/00 the URAA limits for subsidised exports did in practice not cause a constraint for the subsidised exports. However, when world market prices will not improve, the limit on the financial outlay for subsidised sugar exports will become effective in 2000/01. Then either the intervention price or the production of quota sugar (or both) have to be reduced.

Table A2.3 Schedule for reducing quantities of subsidised sugar exports and the corresponding financial outlays

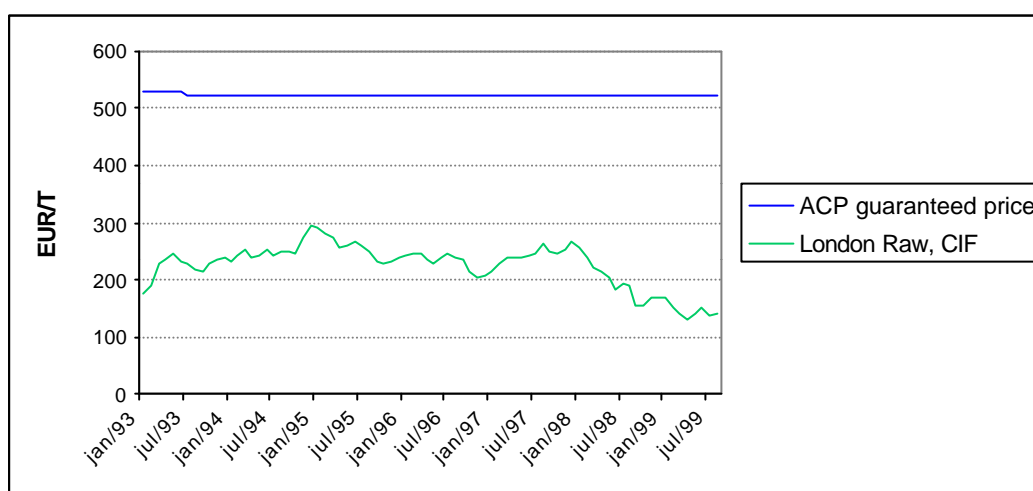|	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Exportable quantities ('000 tonnes) URAA export constraint	1,555.6	1,499.2	1,442.7	1,386.3	1,329.9	1,273.5
Carryover – quantity	0	699.3	998.2	743.2	599.5	
Actual export constraint ('000 t)	1,566.6	2,198.5	2,440.9	2,129.5	1,929.4	
Exported quantity	856.3	1,200.3	1,697.7	1,530.0		
Carry over to next year	699.3	998.2	743.2	599.5		
Amount of subsidy (in mio EUR)						
URAA export constraint	733.1	686.3	639.5	592.7	545.9	499.1
Carryover – budget	0	354.1	514.9	375.3	178.0	
Actual export constraint	733.1	1,040.4	1,154.4	968.0	723.9	
Actual export subsidy	379.0	525.5	779.1	790.0		
Carry over to next year	354.1	514.9	375.3	178.0		

Source: Data from DG Agriculture.

It can be concluded that the CMO Sugar has incorporated the URAA limits in its system of production control quite easily. Until 1999/00 the URAA limits have not yet had an impact on the EC sugar sector and on its import and export performance, because the limits were not yet reached. Particularly the safeguard clause regarding import duties has prevented competition from imported sugar. The limit on the total amount for export subsidies (refunds) will become effective most likely in 2000/01, which will result in either reducing the intervention price or the production of quota sugar or both.

Annex A3 Socio-economic importance of the Sugar Protocol for the ACP countries and India

The Sugar Protocol (plus more recently the SPS Agreement) has assured the ACP countries and India with a stable and relatively high level of sugar export earnings. Their guaranteed export price is much higher than the world market price and more or less stable (see figure a.1) while the annual quota of the Sugar protocol are fixed.
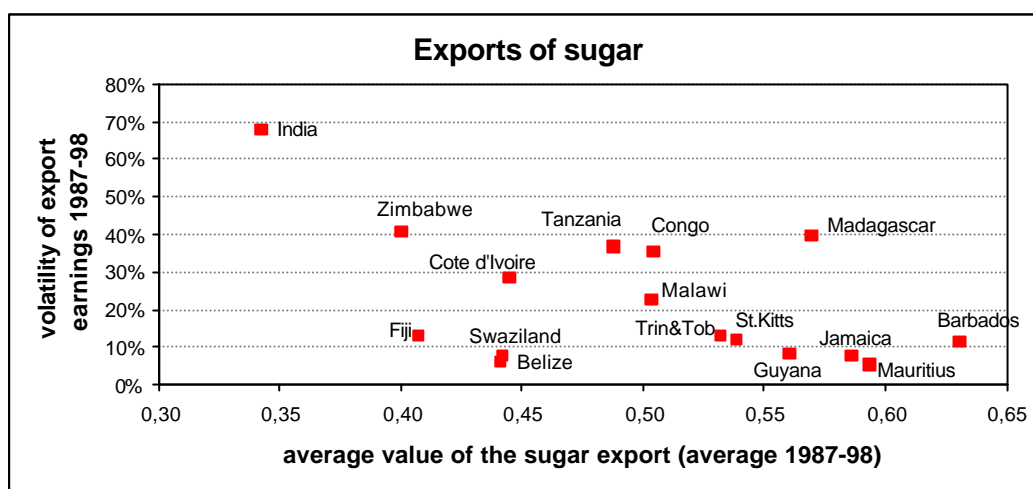
Figure a.1   Evolution of the guaranteed price for ACP sugar and the world raw sugar price

Source: ACP price from ACP Secretariat, CIF price for raw sugar from F.O. Licht – converted to EUR/t by using official exchange rates.

The effect of the sugar export to the EC on the stability of total sugar export earnings is illustrated in figure a.2 and table a.2. It appears that the higher the share of the quota of Preferential Sugar (PS, sugar supplied under the Sugar Protocol) and Special Preferential Sugar (SPS) in the total sugar exports, the lower the volatility of total sugar export earnings. (e.g. for Barbados, Mauritius, Jamaica and Guyana). Thus the Sugar Protocol and SPS agreement do not only assure a high level of export earnings but improve also the stability of sugar export earnings.

Figure a.2 Preferential exports and volatility of export earnings

Note: the volatility measure used is: $\dfrac{1}{n}\sum_{t=1}^{n}\dfrac{\left|Y_t-\hat{Y}_t\right|}{\hat{Y}_t}$, where

Yt are the observed sugar export earnings in year t,

Yt are the sugar export earnings estimated for year t by fitting a linear trend to the observed values, and

n is the number of observations (=12).

Accordingly, volatility is measured as the percentage deviation of the sugar export earnings from their linear trend levels for the period 1987-98.

Source: Based on FAOSTAT data.

Table a.2   Importance of preferential exports

	% of sugar production exported	PS+SPS quotas as % of total sugar export
Barbados	84%	117%
Belize	88%	49%
Congo, Rep. Of	80%	45%
Côte d'Ivoire	14%	56%
Fiji	65%	79%
Guyana	93%	82%
Jamaica	72%	99%
Madagascar	26%	39%
Malawi	20%	80%
Mauritius	93%	96%
Saint Kitts and Nevis	53%	108%
Swaziland	48%	69%
Tanzania	11%	73%
Trinidad and Tobago	77%	92%
Zambia	36%	16%
Zimbabwe	29%	48%
ACP	58%	79%
India	4%	4%
ACP + India	15%	64%

Source: FAOSTAT, F.O. Licht, USDA, ACP secretariat.

Other studies show similar results. Herrmann, Burger and Smit (1993:229) analyse the effects of the Sugar Protocol on the stability of export earnings over the period 1975-88. They conclude that the Sugar Protocol reduced the volatility of export earnings by more than 50% in Barbados, Jamaica, Mauritius, St. Kitts and Nevis, and in Trinidad and Tobago, but only by 1% in India. Schmitz (1982) and Koch (1989, 1990) also concluded that the sugar protocol contributes to the stability of sugar export earnings of ACP countries.

The fact that the prices of the PS and SPS are usually (much) higher than the world market price constitutes an income transfer to the ACP countries and India (see table a.3). This transfer is equal to: $(p_{PS} - p_m) * q_{PS} + (p_{SPS} - p_m) * q_{SPS}$, with p_m being the world market price and p_{PS} and p_{SPS} the guaranteed prices for preferential and special preferential sugar respectively. The SP and SPS arrangements create an income transfer of more than 500 million ECU[4] per year. About 70% of this transfer is to the benefit of four countries only (Mauritius, Fiji, Guyana and Swaziland), while Mauritius alone receives about 36% of the total transfer.

Table a.3   Income transfers through preferential sugar trade

Country	SPS+PS extra revenue 1000 ECU	Extra revenue per capita ECU/capita
Barbados	17,166	64.5
Belize	14,790	62.7
Congo	3,703	1.3
Côte d'Ivoire	6,593	0.5
Fiji	60,118	72.7
Guyana	58,422	68.2
Jamaica	43,367	16.8
Madagascar	4,055	0.3
Malawi	10,461	1.0
Mauritius	178,531	154.0
Saint Kitts and Nevis	5,715	139.4
Swaziland	51,474	52.1
Tanzania	3,703	0.1
Trinidad and Tobago	16,037	12.2
Zambia	3,406	0.4
Zimbabwe	18,214	1.6
ACP	495,756	4.8
India	6,072	0.0
ACP + India	501,828	0.5

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[4]   The calculation is based on a world market price of 230.94 ECU/T (average London CIF price of raw sugar in 1997/98, converted to ECU/T), a preferential sugar price of 292.76 ECU/T and a special preferential price of 265.86 ECU/T. The quantities used are the delivery quotas for preferential and special preferential sugar for the 1997/98 campaign.

The preferential exports are of vital importance for some countries, in terms of contribution to the GDP and employment creation. Moreover in some countries sugar production costs are well above the average level of the world market price, which implies that the sugar industry can only survive on the basis of selling sugar under the preferential arrangements with the EC (e.g in the case of Barbados). Furthermore, in many ACP countries, such as Barbados, it is very difficult to find an alternative for sugar growing.

For some other countries, like Zambia and India, the SP and SPS represent only a small portion of total sugar exports. For those countries, the conditions on the world market are a decisive element for the level and stability of their sugar export earnings, while the income form SP and SPS exports is just something in addition.

Annex A4   Total production of sugar per Member State, 1990/91-1998/99 (in 1,000 tonnes of white sugar)

Member State		Quota	1990 /91	1991 /92	1992 /93	1993 /94	1994 /95	1995 /96	1996 /97	1997 /98	1998 /99
Austria	Q	390						390	390	390	390
	C							53	102	94	100
	T							443	492	484	490
Belgium	Q	826	826	826	826	826	826	826	826	826	794
	C		201	66	67	217	44	62	127	192	0
	T		1,027	892	893	1043	870	888	953	1,018	794
Denmark	Q	425	425	425	411	425	425	425	425	425	425
	C		119	43	0	96	23	7	79	113	106
	T		544	468	411	521	448	432	504	538	531
Finland	Q	147						147	136	147	125
	C							15	0	36	0
	T							162	136	183	125
France	Q	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319	3,319
	C		1,038	741	1,026	1,028	696	880	860	1,404	974
	T		4,357	4,060	4,345	4,347	4,015	4,199	4,179	4,723	4,293
French DOM	Q	483	245	252	289	242	213	246	264	247	239
	C		0	0	0	0	0	0	0	0	0
	T		245	252	289	242	213	246	264	247	239
Germany	Q	3,449	3,449	3,449	3,449	3,449	3,449	3,449	3,449	3,449	3,449
	C		852	460	599	903	223	377	753	596	575
	T		4,301	3,909	4,049	4,352	3,672	3,826	4,202	4,045	4,024
Greece	Q	319	287	273	319	307	250	287	265	319	203
	C		0	0	35	0	0	0	0	45	0
	T		287	273	354	307	250	287	265	364	203
Ireland	Q	200	200	200	200	177	200	200	200	200	200
	C		25	13	23	0	13	22	27	5	19
	T		225	213	223	177	213	222	227	205	219
Italy	Q	1,568	1,458	1,509	1,568	1,419	1,492	1,491	1,437	1,568	1,568
	C		0	0	300	0	0	0	0	171	28
	T		1,458	1,509	1,868	1,419	1,492	1,491	1,437	1,739	1,596
Netherl.	Q	872	872	872	872	872	872	872	872	872	825
	C		362	174	278	261	95	116	163	148	0
	T		1,234	1,046	1,150	1,133	967	988	1,035	1,020	825
Portugal	Q	80	2	1	2	3	6	5	3	70	66
	C		0	0	0	0	0	0	0	0	0
	T		2	1	2	3	6	5	3	70	66
Spain	Q	1,000	953	864	955	1,000	1,000	1,000	1,000	1,000	1,000
	C		0	0	0	213	116	98	201	144	161
	T		953	864	955	1,213	1,116	1,098	1,201	1,144	1,161
Sweden	Q	370						356	370	370	370
	C							0	28	26	29
	T							356	398	396	399
UK	Q	1,144	1,144	1,144	1,144	1,144	1,144	1,144	1,144	1,144	1,144
	C		93	72	329	290	117	72	327	444	296
	T		1,237	1,216	1,473	1,434	1,261	1,216	1,471	1,588	1,440
Total EC	**Q**	**14,582**						**14,157**	**14,100**	**14,346**	**14,117**
	C							**1,702**	**2,667**	**3,418**	**2,288**
	T							**15,859**	**16,767**	**17,764**	**16,405**

Source: Total sugar production per Member State: Eurostat. Total production figures France and French Overseas Territories (DOM): FIRS, 1999. Tableau C.1 plus tableau B.18.

Notes: 1) Q = quota production; C = C sugar production; T = total production. 2) The effect of C- stocks carried forward to the next year and the turned into quota sugar has not been taken into account (see section 2.3.2). When that carry forward system is taken into account the annual figures of Member States with a (temporary) shortfall of production might be slightly different. 3) The last row indicates that total sugar production was 8.8 to 21.8% higher than the total of the quotas. The second last row shows that, even though total production is higher than the total of the quotas, the total of the quotas can not be used entirely, because some Member States do not use their national quota entirely. That shortfall can not be transferred to Member States, which produce more than their quota. The difference between the last row and the second last row is sugar which is exported outside the EC as C-sugar.

Annex B   Effective minimum revenues per tonne of sugar

An analysis has been made of the effective minimum revenues per tonne of sugar in each Member State. The figures are presented in the tables B.1 to B.14. The effective minimum revenues in financial ECUs are summarised in annex C.

The most important columns of the tables B.1 to B.14 are:
▲ column 6 containing the effective minimum revenue in agricultural ECU/tonne, which is equal to the Intervention Price plus regional premium plus national support minus the production levies (average of basic levy plus B levy plus additional levy per tonne of quota sugar);
▲ column 8 containing the effective minimum revenue in current national currency, which is equal to the effective minimum revenue in agricultural ECU/tonne multiplied by the agricultural exchange rate;
▲ column 10, containing the effective minimum revenue in financial ECU/tonne, which is equal to the effective minimum revenue in national currency multiplied by the financial exchange rate.

Subsequently three indexes are shown in the graphs B.1 to B.10, namely:
▲ the index of the effective minimum revenue in current national currency (see also column 11 of the tables);
▲ the index of the effective minimum revenue in constant values of the national currency (1986/87 = 100, see also column 13 of the tables);
▲ the index of the effective minimum revenue in financial ECUs (see also column 14 of the tables).

Annex C   Effective minimum revenues per tonne of sugar in financial Ecus

The evolution of the effective minimum revenues per tonne of sugar in financial ECUs in the various Member States is shown in table C.1 and figures C.1 and C.2. These effective minimum revenues should be understood as the minimum net receipts from selling sugar. That net revenue has to be shared by the sugar beet processor and the farmer.

Comparison of the data of table C.1. and the two graphs reveals that:
▲ The growth rate of the effective minimum revenue in financial ECUs was roughly the same for all Member States over the period 1981/82 to 1998/99, except in the case of Spain and Italy.
▲ The effective minimum revenue was much higher in the latter two countries than in the other Member States, mainly due to the national support. The decrease of the national support has also caused a decrease of the effective minimum revenue in those two countries since 1993/94.
▲ The difference between the highest and lowest effective minimum revenue across the Member States in a given the year has always been substantial. The difference varied from 69% in 1987/88 to 17% in 1998/99 (see last column of the table C.1). A large part of the difference is caused by the substantial national support in Italy and Spain. If these two countries are not taking into account, and ignoring the low prices in Germany from 1984/85 to 1989/90, the difference between the highest and lowest effective support prices has always been in the order of 10%.

Annex D Data on consumer sugar prices

Annex D1 Consumer sugar prices in some Member States and regions (in national currencies)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	13.97	13.79	14.16	14.4	14.27	9.05	8.94	9.41	9.57	9.75	9.68	9.89	9.89	10.03
Germany 3							1.89	1.94	1.91	1.9				
Germany							1.8	1.84	1.79	1.78				
Spain	98	109	119	123	125	126	128	130	139	141	151	151	151	152
France									7.45	7.63	7.74	7.9	8.12	8.11
U.K.	0.48	0.47	0.51	0.54	0.59	0.64	0.66	0.64	1.5	1.34	1.59	0.76	0.76	0.67
Italy Milan	1285	1307	1370	1369	1410	1506	1643	1658	1788	1840	2163	2039	1881	1735
Italy Naples	1287	1310	1369	1390	1423	1510	1683	1712	1866	1982	2326	2273	2117	2044
Italy Rome	1296	1317	1362	1376	1406	1533	1645	1677	1851	1990	2238	2278	2206	2127
Netherlands	2.29	2.34	2.34	2.32	2.04	2.04	2.04	2.04	1.95	1.92	1.88	1.89	1.87	1.87
Sweden						7.28	7.35	7.32	7.2	7.35	10.96	9.34	9.49	9.53

Source: ILO Labour Statistics Databases. Special supplement to the Bulletin, October inquiry results. Retail prices of selected food items, August 17, 1999. Copyright © International Labour Organisation 1999. Summary of extracted data by country and coverage.

Annex D2 Indices of consumer sugar prices of some Member States and regions

1985=100

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	100.0	98.7	101.4	103.1	102.1	64.8	64.0	67.4	68.5	69.8	69.3	70.8	70.8	71.8
Spain	100.0	111.2	121.4	125.5	127.6	128.6	130.6	132.7	141.8	143.9	154.1	154.1	154.1	155.1
U.K.	100.0	97.9	106.3	112.5	122.9	133.3	137.5	133.3	312.5	279.2	331.3	158.3	158.3	139.6
Italy Milan	100.0	101.7	106.6	106.5	109.7	117.2	127.9	129.0	139.1	143.2	168.3	158.7	146.4	135.0
Italy Naples	100.0	101.8	106.4	108.0	110.6	117.3	130.8	133.0	145.0	154.0	180.7	176.6	164.5	158.8
Italy Rome	100.0	101.6	105.1	106.2	108.5	118.3	126.9	129.4	142.8	153.5	172.7	175.8	170.2	164.1
Netherlands	100.0	102.2	102.2	101.3	89.1	89.1	89.1	89.1	85.2	83.8	82.1	82.5	81.7	81.7

Source: ILO Labour Statistics Databases. Special supplement to the Bulletin, October inquiry results. Retail prices of selected food items, August 17, 1999. Copyright © International Labour Organisation 1999. Summary of extracted data by country and coverage.

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Annex D3   Consumer price indices for food in some Member States

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	100	103.7	107.8	112.7	118.1	121.2	124.1	126.7	128.3	130.9	133.6	136.3	138.9
Spain	100	108.8	114.5	120	128.2	136.8	145	153.5	160.6	168.1	176	182.2	185.7
United Kingdom	100	103.4	107.7	113	121.8	133.3	141.1	146.4	148.7	152.4	157.6	161.5	164.4
Italy	100	105.9	110.9	116.5	123.8	131.8	140	147.3	153.8	160	168.3	174.9	178.3
Netherlands	100	100.2	99.8	100.7	101.7	104.2	108.3	111.7	114.6	117.8	120.1	121.8	124.1

Source: ILO Labour Statistics Databases. Special supplement to the Bulletin, October inquiry results. Retail prices of selected food items, August 17, 1999.
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Annex E   Data on High Fructose Syrups production

Annex E.1   High Fructose Syrups Production by country (in tonnes, dry matter)

	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
UEBL	72,252	71,668	72,250	72,250	72,250	66,725	72,091	72,232	75,670
Finland	9,000	15,000	20,000	20,000	11,930	12,425	11,930	11,930	11,930
France	20,022	19,926	20,022	20,022	20,022	20,000	20,022	20,023	20,022
Germany	35,684	34,496	35,684	35,684	35,684	35,684	35,328	35,684	35,684
Greece	9,795	12,334	11,712	12,736	12,985	12,985	13,000	13,000	13,997
Italy	20,463	20,439	20,476	20,475	20,490	21,213	20,465	20,468	21,395
Netherlands	9,159	9,176	9,175	9,175	9,175	8,956	9,175	9,140	9,175
Portugal	5,214	6,609	7,899	9,261	10,000	10,000	10,000	10,000	10,324
Spain	83,000	82,999	82,992	83,000	83,000	83,000	83,000	83,000	83,000
United Kingdom	27,469	27,432	27,397	27,303	27,318	26,778	27,016	27,246	27,983
EU	*292,058*	*300,079*	*307,607*	*309,906*	*302,854*	*297,766*	*302,03*	*302,72*	*308,18*
Bulgaria	8,000	5,348	5,000	5,000	15,000	25,000	25,000		
Hungary	40,000	40,000	40,000	40,000	104,000	117,000	130,000		
Ex USSR	8,000	8,000	10,000	10,000	10,000	10,000	30,000		
Ex-Yugoslavia	10,000	8,000	5,000	10,000	25,000	30,000	35,000		
Europe	**358,058**	**361,427**	**367,607**	**374,906**	**456,854**	**479,766**	**522,863**		
(Egypt) Africa	**40,310**	**39,600**	**51,240**	**69,387**	**73,196**	**93,000**	**94,000**		
Canada	250,000	250,000	255,000	260,000	255,000	255,000	265,000		
United States	5,872,000	6,053,750	6,331,350	6,770,435	7,093,400	7,357,392	7,584,200		
Mexico	0	0	0	0	0	25,000	120,000		
Uruguay	18,000	18,000	18,000	20,000	25,000	25,000	0		
Argentina	154,000	150,000	188,000	210,000	205,000	190,000	210,000		
America	**6,294,000**	**6,471,750**	**6,792,350**	**7,260,435**	**7,578,400**	**7,852,392**	**8,179,200**		
China	30,000	30,000	35,000	35,000	50,000	70,000	85,000		
India	3,000	5,000	5,000	5,000	5,000	5,000	5,000		
Indonesia	14,000	12,000	10,000	14,000	14,000	25,000	30,000		
Japan	782,788	794,405	746,889	727,416	806,000	789,000	798,000		
Malaysia	16,000	18,000	18,000	20,000	25,000	28,000	28,000		

	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Pakistan	3,000	0	0	0	0	0	0		
Singapore	5,000	5,000	5,000	5,000	7,000	7,000	7,000		
Korea (South)	276,000	230,000	199,000	215,000	213,000	221,000	224,000		
Taiwan	110,000	125,000	165,000	173,000	180,000	195,000	200,000		
Thailand	20,000	24,000	28,000	30,000	42,000	50,000	65,700		
Asia	**1,259,788**	**1,243,405**	**1,211,889**	**1,224,416**	**1,342,000**	**1,390,000**	**1,442,700**		
Pacific	**3,500**	**3,500**	**3,500**	**5,000**	**6,000**	**1,500**	**2,000**		
World	**7,955,656**	**8,119,682**	**8,426,586**	**8,934,144**	**9,456,450**	**9,816,658**	**10,240,763**		

Source: F.O. Licht and European Commission, DG Agriculture.

Annex E.2   High Fructose Syrup Production since 1990/91 by continent (in tonnes dry matter)

	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00
Europe	358,058	361,427	367,607	374,906	456,854	479,766	522,863			713,180
of which EU	*292,058*	*300,079*	*307,607*	*309,906*	*302,854*	*297,766*	*302,863*	*302,722*	*308,180*	*308,180*
America	6,294,000	6,471,750	6,792,350	7,260,435	7,578,400	7,852,392	8,179,200			9,657,000
of which US	*5,872,000*	*6,053,750*	*6,331,350*	*6,770,435*	*7,093,400*	*7,357,392*	*7,584,200*			*8,645,000*
Asia	1,259,788	1,243,405	1,211,889	1,224,416	1,342,000	1,390,000	1,442,700			2,400,000
(Egypt) Africa	40,310	39,600	51,240	69,387	73,196	93,000	94,000			
Pacific	3,500	3,500	3,500	5,000	6,000	1,500	2,000			
World	**7,955,656**	**8,119,682**	**8,426,586**	**8,934,144**	**9,456,450**	**9,816,658**	**10,239,926**			

Source: F.O. Licht and European Commission, DG Agriculture. Estimates 2000 based on McKeany-Flavell, except for EU (set equal to 1998/99) and Europe (EU plus Russia (30000), rest estimate McKeany-Flavell).

Annex F   Background paper on beet production

1.   Introduction

This annex describes some particularities of beet production in the EC, as far as they are relevant in the context of the analysis presented in the chapters 8 to 12.

First, a global overview of production volumes and trends is given. Next is a general technical description of beet production, followed by an overview of the development of the beet production technology (Section 4). Apart from the CMO, technical progress has also had an impact on the structure and profitability of beet production. In order to be able to separate the effect of these two factors (CMO and technical progress), an analysis of the development of the technology cannot be left out.

Next, an analysis of the development of production cost (section 5) is made. The trend in beet production cost is compared with the general trend in agriculture. Section 6 deals with the analysis of gross and net margins for sugar beet production and data are cross-checked in section 7. The last section, section 8 deals with structural changes in arable farming in the EC over the last 20 years, in order to assess the impact of the CMO on the farms structure.

2.   Beet production in the EU

The table below indicates the trends in sugar beet production volume in the member states form 1982 till 1997. France is the largest beet producing country, followed by Germany. Those member states together account for some 50% of all sugar beet production in the EC. The increase in production has been mainly due to the expansion of the EU (accession of new member states and enlargement of Germany), but various member states have also increased their production significantly (France (av. 0.8% per year), Italy (0.7% per year) and the UK (av. 0.5% per year).

Table F.1 Volume of sugar beet production in the EU member states (1982-1997) ('000 tonne. EU12 and EU15 : *10^6 tonne)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	% of EU
Bel.	7,430	5,120	5,763	5,952	5,886	5,425	6,109	6,061	6,418	5,676	5,957	6,264	5,394	6,081	6,075	5,623	6%
Denm	3,624	2,616	3,614	3,515	3,195	2,632	3,379	3,309	3,533	3,235	2,974	3,635	3,138	3,130	3,064		3%
Ger	22,732	16,295	0,060	20,813	20,260	19,049	18,590	20,767	23,310	25,926	27,150	28,606	24,211	26,049	26,064	25,769	23%
Greece	2,452	2,413	1,775	2,515	2,516	2,025	2,000	3,435	2,760	2,571	3,000	2,719	2,420	2,562	2,352	3,000	3%
Spain	9,085	9,619	8,095	6,619	7,746	7,937	8,926	7,333	7,361	6,679	7,234	9,231	8,360	7,438	8,440	8,577	8%
France	32,331	26,320	28,752	29,989	25,873	26,284	28,588	28,314	31,746	29,520	31,685	31,805	29,084	30,571	30,943	34,155	29%
Ireland	1,659	1,630	1,694	1,309	1,274	1,623	1,334	1,451	1,480	1,409	1,397	1,117	1,390	1,547	1,485		1%
Italy	11,397	10,084	11,490	9,567	14,958	15,325	13,541	16,891	11,768	11,975	14,630	11,066	12,629	13,188	12,125		12%
Lux	-	1	1	-	-	-	-	-	-	-	1	1	1	1	-		0%
Neth	7,946	5,445	6,955	6,335	7,707	6,920	6,737	7,679	8,623	7,189	8,251	7,479	6,149	6,449	6,416	6,606	7%
Aust.														2,886	3,131	3,012	3%
Port.	90	42	66	31	39	19	8	12	13	12	19	32	50	57	32	32	0%
Finl.														1,110	897	1,355	1%
Swe														2,478	2,430	2,639	2%
UK	10,007	7,494	9,015	7,715	8,120	7,992	8,152	8,113	8,000	7,673	9,300	8,988	8,016	8,431	8,804	10,527	8%
EU-15														**112**	**112**	**101**	**100%**
EU-12	**108**	**87**	**97**	**94**	**97**	**95**	**97**	**103**	**105**	**101**	**111**	**110**	**100**	**105**	**105**	**94**	

Source: Eurostat various years.

3. Beet production characteristics

Biophysical conditions
Sugar beet is a crop that can be grown in large parts of the world. For optimal sugar production biophysical circumstances are very important. Daylight and sunshine determine the sugar content of the beet, whereas beet yields are largely determined by the availability of water. Beet can be grown everywhere in the EC, but usually, yields are higher in the north (because of more water available) and sugar content will be higher in the south.

Beet prefers not too heavy soils. On the other hand light soils warm up easier and are therefore more susceptible to soil-borne diseases.

Planting and nutrition
Beet is normally sown in March and April. Land preparation include ploughing and levelling. Beet seed is usually of a monogerm type. Disease resistant varieties. are common nowadays as a result of succesful breeding programmes in the past. Most farmers use pilled seed to which fungicides and antagonists are added. This allows for a healthier stand of the crop in early growth stages, which affects final yields positively. In the northern Member States, planting is done either by contractors or with machines owned by the farmer. Beet is not very demanding in terms of fertiliser. Compared to for instance potato, beet requires some 30-50% less N, P_2O_5 and K_2O (depending on soil type and rotation).

Crop protection and maintenance
Weeding used to be the most important cost factor. But with the introduction of herbicides and mechanical weed control, these costs have been reduced substantially. Beet can suffer significantly from diseases (*Rhizomania, Rhizoctonia solani, Cercospora*) whose incidence increases with a more tight rotation (most diseases also affect other root crops).

Harvest
Harvest is normally done by contractors. In the northern Member States, 6-row harvesters are common, in the southern Member States smaller machinery is used. Harvest takes place between October and December. As the sugar content of the beet decreases after harvest, on farm storage is limited and most beets are delivered to the factory before mid-December.

4. Technology development

The development of technology in beet production has caused both higher yields and a reduction of costs. The main factors since the 1950s were:

Yield increasing technologies:

▲ Breeding: monogerms are commonly used. Better varieties (higher production and less vulnerable for diseases) have been introduced.
▲ Better crop husbandry. Development of pesticides.
▲ Better harvest and post harvest techniques, which as contributed to lower crop losses, and therefore higher yields.
(Source: EC (PECO/FR/1064), 1992).

Cost reduction technologies:
▲ Mechanical drilling.
▲ Mechanical weeding. Whereas about 20 years ago all beet fields were weeded by hand (30 labour days per hectare), weeding is now largely mechanised (particularly in the northern Member States), costing virtually only one labour day per hectare.
▲ Mechanical harvesting. Mechanical harvesting was introduced around World War II. One or two row harvesters were common twenty years ago, but in the northern Member States, mainly 6-row harvesting machines are applied nowadays.
▲ Post harvest: Utilisation of beet pulp. Wet pulp is becoming more and more replaced by concentrate fodder, with a higher added value. Especially in countries with high livestock densities (The Netherlands, Belgium) the by-product of beet contributes significantly to overall profitability.

Research and development of beet production technology are nowadays focussed on increasing productivity and reduction of costs. A new theme is the attention for more environmental friendly production. The following themes appear high on today's research agenda:
▲ Breeding: pest resistance and technological quality.
▲ Crop husbandry: more intelligent pest control (higher incidence of diseases and fewer pesticides allowed).
▲ Mechanisation: harvesting techniques, reduction of tare.
▲ Post harvest: reduction of losses; Expand length of harvest period; Utilisation of by-products (e.g. animal feed from beet pulp); higher added value.
(Source: IRS, 1999)

The development of genetically modified (GM) varieties has received relatively little attention compared to some other arable crops. This can be partly explained by the reluctance of the sugar processing industry to use GM sugar in their products, as EC consumer preferences are largely against GM food[5]. Another factor might be that benefits from GM can be found mainly in the field of higher yields. As explained above, this is not the top priority of the sector.

As a result of these technological changes, beet yields have increased with roughly 6% from 1982-1984 tot 1996-1998 (EC averages). Of course, climatological circumstances may affect yields from year to year. Therefore, usually a 10 year moving average is taken to depict beet yield developments (See table F.2 and Figure F.1).
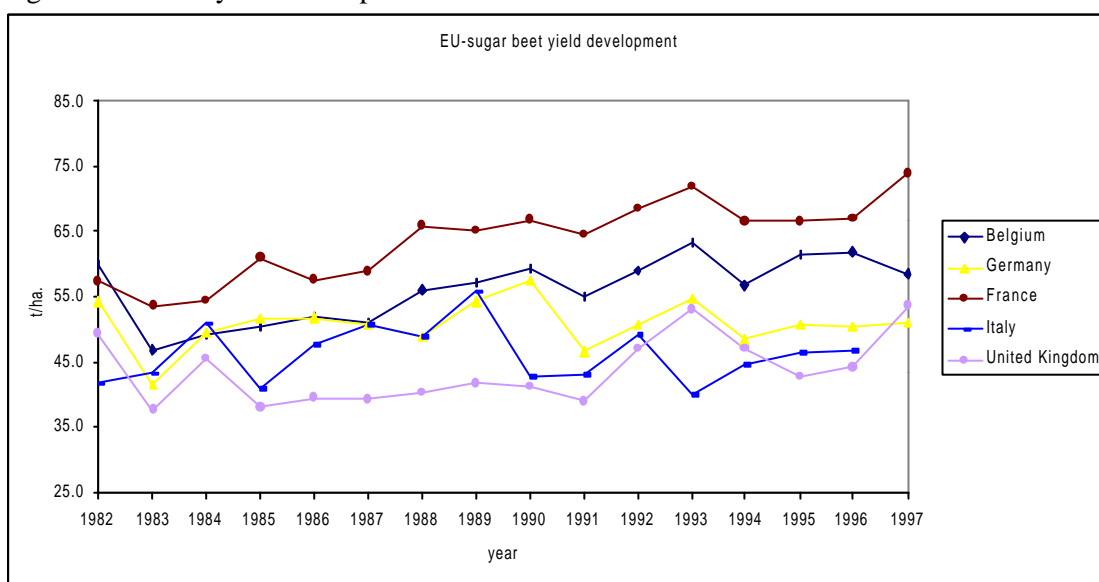
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[5] Especially in the UK this is an issue. On one hand, because of other recent food scandals (and a corresponding negative press) and the competition of cane sugar, which is associated with "natural" and "healthy" food.

Table F.2 Beet yield development in EC Member States (1982-1998)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Bel.	59.9	47.0	49.3	50.4	52.1	51.2	56.0	57.2	59.4	55.1	59.0	63.3	56.8	61.4	62.0	58.6	58.9
DK	47.1	36.3	48.8	48.2	45.6	39.3	49.7	49.4	53.5	49.8	45.8	55.1	47.5	46.7	43.8		49.0
Germ.	54.4	41.5	49.5	51.6	51.9	50.7	49.1	54.2	57.4	46.8	50.8	54.8	48.4	50.8	50.6	51.1	51.4
Greece	61.3	61.9	61.2	61.3	59.9	67.5	55.6	70.1	62.7	65.9	60.0	59.1	60.5	61.0	58.8	56.6	61.0
Spain	35.1	38.6	36.6	37.0	39.5	44.3	46.7	42.1	43.6	40.5	44.4	51.3	45.7	43.2	53.8	55.3	46.7
France	57.5	53.7	54.7	61.1	57.6	58.9	66.0	65.4	66.8	64.6	68.7	72.1	66.6	66.7	67.1	73.9	67.8
Ireland	48.8	45.3	48.4	39.7	34.4	43.9	40.4	45.3	46.3	42.7	45.1	34.9	39.7	44.2	46.4		42.8
Italy	41.7	43.5	51.1	41.1	47.9	50.7	49.1	55.9	42.9	43.2	49.4	40.1	44.8	46.4	47.0		46.5
Netherl	59.3	46.5	53.9	48.4	55.8	54.1	54.8	61.9	69.0	58.4	68.2	63.9	53.5	55.6	54.8	57.9	59.8
Austria								56.2	49.9	49.5	48.2	56.5	49.3	55.5	59.1	57.9	53.6
Portugal	30.0	21.0	33.0	15.5	39.0	19.0	8.0					32.0	50.0	57.0	32.0		
Finland							33.5	31.9	35.2	32.6	32.8	30.2	32.3	31.7	25.6	38.7	32.4
Sweden								52.0	55.5	41.7	44.5	48.8	44.3	42.7	41.2	44.0	46.1
UK	49.3	37.7	45.5	38.2	39.6	39.4	40.6	41.8	41.2	39.1	47.2	53.2	47.2	43.0	44.2	53.7	45.1
EC-15								55.0	55.0	50.2	54.5	56.3	51.8	52.6	53.6	47.8	53.0
EC-12	51.1	44.9	49.6	54.7	50.0												

Source: Adapted from Eurostat, various issues.

Figure F.1   Beet yield development in selected EC member states

Note: In order to keep the picture legible, only a limited selection of member states is included.
Source: Adapted from Eurostat, various issues.

5.   Development of production costs

Eurostat and the FADN do not provide data regarding the evolution of the production costs of sugar beets specifically. Only some indications regarding the production costs of beets can be retrieved from more general indicators.

Eurostat provides two sets of data which can be related to the costs of agricultural production in general, namely: index of prices of goods and services consumed for agricultural production (see table F.3) and index of prices investments for agricultural production (see table F.4).

Table F.3 Index of purchase prices of the means of agricultural production: deflated index prices (1990 = 100) : goods and services consumed

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
EC-15											100	97	95	93	91	91	92	91
EC-12								107	105	105	100	98	95	94	92	92	93	
Belgium	133	134	132	131	130	124	114	107	107	108	100	97	95	91	89	87	89	90
Denmark	129	136	138	137	136	126	115	106	106	105	100	97	94	93	89	88	89	89
Germany	123	127	125	122	122	117	108	102	102	105	100	98	96	92	90	89	90	90
Greece	132	131	124	129	125	123	118	110	105	101	100	102	99	97	97	94	95	92
Spain						131	124	114	110	106	100	96	92	91	90	88	89	89
France	122	121	121	121	122	117	110	105	103	104	100	98	96	94	93	93	94	95
Ireland	145	138	129	126	125	120	111	102	103	103	100	97	94	93	92	91	93	90
Italy	144	146	140	134	132	123	115	110	107	104	100	96	93	96	93	98	97	93
Luxemb.	91	92	91	91	92	87	81	102	101	103	100	99	96	91	90	89	91	90
Netherl.	125	128	126	127	127	119	109	101	103	105	100	97	95	91	88	89	91	89
Austria													96	94	89	85	88	90
Portugal						133	128	122	116	108	100	95	89	80	79	76	73	69
Finland													102	102	97	75	76	77
Sweden													93	88	88	91	97	98
UK	125	123	121	124	123	117	111	107	108	106	100	98	97	100	98	97	101	95

Source: Eurostat, various issues.
Notes:
- The weighting scheme of the individual items is a reflection of the actual use of the inputs. Because of changes in technology, the weighting scheme has changed over time.
- The prices are deflated against the implicit price index of GDP at market prices.

Table F.4 Index of purchase prices of the means of agricultural production: deflated index prices (1990 = 100): Investments

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
EC-15										100	100	100	100	99	99	99	99
EC-12							99	100	100	100	100	100	100	99	99	99	
Belgium	91	92	93	93	95	97	96	97	100	100	100	100	101	101	103	102	103
Denmark	99	98	98	97	97	97	97	98	98	100	100	100	100	99	100	100	100
Germany	94	94	95	95	94	97	98	99	99	100	101	101	101	99	99	99	98
Greece	110	110	109	108	109	115	109	106	106	100	98	94	95	92	94	92	90
Spain					105	102	101	101	101	100	96	92	91	91	92	94	95
France	98	97	97	97	96	97	98	99	100	100	100	100	100	100	100	101	101
Ireland	99	99	99	99	97	97	97	99	100	100	99	99	100	102	104	104	105
Italy	98	99	101	102	101	100	99	100	99	100	100	101	101	100	100	100	101
Luxemb.	59	58	58	58	58	60	39	38	40	100	101	104	101	100	100	99	99
Netherl.	89	88	88	88	88	91	94	96	98	100	102	102	101	95	96	96	93
Austria												102	101	101	100	101	101
Portugal					95	99	106	108	108	100	95	103	100	104	107	108	112
Finland												96	97	98	83	84	83
Sweden												96	97	100	103	104	104
UK	99	100	101	102	101	102	103	105	104	100	100	100	102	101	101	101	100

Source: Eurostat, various issues.
Notes:
- The weighting scheme of the individual items is a reflection of the actual use of the inputs. Because of changes in technology, the weighting scheme has changed over time.
- The prices are deflated against the implicit price index of GDP at market prices.

On the basis of the tables F.3 and F.4, it can be concluded that, at least in real terms, the prices of the means of agricultural production did not increase. Overall, prices of investment goods have remained stable, whereas the prices of direct inputs (feeding stuffs, fertiliser, plant protection chemicals, fuels and lubricants) have decreased by some 10% since the beginning of the 1990s and even by 20-40% since 1980. The costs of production may have decreased even stronger than the prices, due to more efficient use of inputs.

The FADN provides data on production costs per farm type, but not specified per product. However, data can be retrieved specifically for farms, which have a large share

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(40-60%) of beet production in total farm production. Comparing cost levels of 1989-1991 with those of 1994-1996, results in approximates of the development of the production costs of beet (see table F.5). Although these data should be considered with caution, one can observe a general trend toward cost reduction on the farms concerned between the two periods. Reduction of costs of fertiliser, crop protection and contract work account for 50% of overall reduction in variable costs. As far as labour is concerned, costs have decreased significantly[6] in most Member States for which data are available. The share of paid wages in overall variable costs has reduced slightly, and accounts now for some 6% of overall variable costs. Only in Spain and the UK, the share is 15-20%.

Table F.5 Percentage change of the average (real) production costs per hectare of farms with a large share of sugar beet in total farm production (1994-96 vs. 1989-91)

	Belgium (*)	Denmark (*)	Germany (**)	Greece (**)	Spain (***)	France (*)	Italy (***)	United Kingdom (*)
Seed & seedlings purchased	6%	1%	8%	-9%	-21%	25%	0%	11%
Fertilisers	-15%	-14%	-21%	68%	-40%	-7%	-4%	6%
Protection	-24%	-14%	-34%	1%	15%	5%	53%	7%
Motor fuel & lubricants	-16%	-42%	-4%	31%	-29%	-6%	53%	5%
Water				6%	33%		21%	
Other crop specific costs	-58%	-56%	-66%	104%	52%	477%	-40%	31%
TOTAL SPECIFIC COSTS (A)	**-15%**	**-15%**	**-21%**	**24%**	**-22%**	**5%**	**15%**	**9%**
Mach. & Build. Upkeep	15%	-9%	-31%	-15%	-53%	5%	-9%	16%
Energy (excl. fuel & lubricants)	32%	-45%	-41%	8%	-90%	-3%	-28%	3%
Contract works	22%	-8%	16%	-14%	2%	-3%	-25%	-9%
Other direct costs	44%	10%	-4%	2%	-46%	17%	70%	25%
FARMING OVERHEADS (B)	**23%**	**-6%**	**-16%**	**-13%**	**-36%**	**8%**	**-14%**	**8%**
INTERM. CONSUMPTION (A+B)	**-4%**	**-11%**	**-19%**	**8%**	**-27%**	**6%**	**4%**	**8%**
DEPRECIATION (C)	**-8%**	**-22%**	**-19%**	**3%**	**-56%**	**-10%**	**5%**	**8%**
Wages paid	-58%	-35%	-6%	-51%	-47%	1323%	-42%	37%
Rent paid	3%	43%	1%	-31%	-73%	46%	-23%	22%
Interest paid (less subs.)	-17%	-26%	-62%	-45%	-74%	86%	-73%	24%
EXTERNAL FACTORS (D)	**-11%**	**-17%**	**-16%**	**-38%**	**-55%**	**95%**	**-36%**	**30%**
TOTAL INPUT (A+B+C+D)	**-6%**	**-16%**	**-18%**	**-5%**	**-38%**	**13%**	**-1%**	**13%**

Source: Calculations based on FADN database. Data are only presented for countries with sufficient entries. For a glossary on FADN terminology, refer to Annex H.

Notes:

(1) The above results are averages 1994-96 compared with averages 1989-1991

(2) Germany does not include here New Länders

(3) Variable costs are estimated here to equate to the sum of intermediate consumption and wages paid

(*) results refer to farms where the output of the crop concerned represents more than 40% of the farm total output. These results should be considered as indicative.

(**) & (***) results refer to farms where the output of the crop concerned represents more than 50% and 66% of the farm total output, respectively.

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[6] Except for France and the UK. In France labour cost in the base period were almost zero. A minor absolute increase had an extreme effect on the % change.

6. Impact of technology development

Both beet and sugar yield per hectare have increased substantially over the years. It is estimated that about 70% of the increase of sugar yields can be attributed to the development of technology and extension efforts (Vierling, 1996). Other contributing factors include improved extension and the general scaling up that takes place in agriculture.

The increased yields allowed farmers to reduce the area while still producing the quantity of beets as fixed by the delivery rights. The released land could be used for other crops, which, although less profitable than beets, would at least generate additional income. In some Member States, beet area has been reduced by 20% since the 1980s (Table F.6).

Table F.6   Area of sugar beet in EU member states (1982 –1998) ('000 ha)

	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Belgium	124	109	117	118	113	106	109	106	108	103	101	99	95	99	98	96	94
Denmark	77	72	74	73	70	67	68	67	66	65	65	66	66	67	70	69	64
Germany	418	393	405	403	390	376	379	383	406	554	534	522	500	513	515	504	503
Greece	40	39	29	41	42	30	36	49	44	39	50	46	40	42	40	53	37
Spain	259	249	221	179	196	179	191	174	169	165	163	180	183	172	157	155	152
France	562	490	526	491	449	446	433	433	475	457	461	441	437	458	461	462	456
Ireland	34	36	35	33	37	37	33	32	32	33	31	32	35	35	32	32	33
Italy	273	232	225	233	312	302	276	302	274	277	296	276	282	284	258	288	n.a.
Luxemb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neth.	134	117	129	131	138	128	123	124	125	123	121	117	115	116	117	114	110
Austria														52	53	52	50
Portugal	3	2	2	2	1	1	1	-	-	-	-	1	1	1	1	4	4
Finland														35	35	35	32
Sweden														58	59	60	59
UK	203	199	198	202	205	203	201	194	194	196	197	169	170	196	199	196	189
EU-15														2128	2095	2120	n.a.
EU-12	2127	1938	1961	1906	1953	1875	1875	1850	1864	1893	2012	2019	1949	1924	1983	1948	n.a.

Source: Eurostat various years.

Apart from benefits due to the increased yields, the reduction of production costs has also generated significant benefits for beet farmers. The reduction of direct costs is mainly the result of technological development. The labour requirements for beet are now one tenth compared to 30 years ago (50 vs. 500 man hours per hectare) (Hallam, 1994).

Beet revenues and costs
FADN data were used to analyse the trend in beet revenues and costs.

NEI

Table F.7   Gross and net margins for farms dominated by sugar beet production (averages 1994-96, 1996 prices)

	Belgium (*)	Denmark (**)	Germany (**)	Greece (**)	Spain (***)	France (**)	Italy (***)	UK (*)
Sugar-beet area (ha)	*13,1*	*13,3*	*17,1*	*2,9*	*12,0*	*25,6*	*5,8*	*37,3*
Sugar-beet yield (tn/ha)	*61,4*	*45,3*	*56,5*	*67,0*	*45,5*	*67,4*	*50,7*	*42,7*
Sugar-beet price (ECU/tn)	*47,5*	*55,5*	*53,7*	*53,2*	*56,6*	*40,0*	*57,0*	*55,8*
A. Sugar-beet output	**2914**	**2510**	**3033**	**3578**	**2554**	**2695**	**2894**	**2382**
Specific costs	798	590	860	931	696	885	781	732
Farming overheads	444	487	696	529	307	438	363	542
Depreciation	267	346	506	485	149	425	419	313
External factors	389	933	570	398	236	466	136	499
B. Variable costs	**1263**	**1130**	**1674**	**1512**	**1199**	**1423**	**1202**	**1533**
C. Total input	**1898**	**2356**	**2631**	**2342**	**1387**	**2214**	**1699**	**2085**
D. Gross margin (=A-B)	**1651**	**1380**	**1360**	**2066**	**1360**	**1271**	**1515**	**849**
E. Net margin (=A-C)	**1016**	**153**	**403**	**1236**	**1167**	**481**	**1196**	**297**

Source: FADN
Notes
(1) Germany does not include here New Länders.
(2) Variable costs are equal to Specific Costs plus Farming Overheads plus Wages. Wages are part of the category External Factors.
(3) Total input is equal to Specific Costs plus Farming Overheads plus Depreciation plus External Factors.
(4) Data are retrieved from farms, which have a large share of beet output in total farm output. The specific costs are attributed to sugar beet according to the share of beet over the total output of arable crops. Other costs are attributed to sugar beet proportional to its share over total farm output.
(5) (*) refer to farms where the output of the crop concerned represents more than 40% of the farm total output. These results should be considered as indicative.
(6) (**) & (***) refer to farms where the output of the crop concerned represents more than 50% and 66% of the farm total output, respectively.

Table F.8   Gross and net margins for farms dominated by sugar beet production (averages 1989-91, 1996 prices)

	Belgium (*)	Denmark (*)	Germany (**)	Greece (**)	Spain (***)	France (*)	Italy (***)	UK (*)
Sugar-beet area (ha)	*19.0*	*12.2*	*14.5*	*3.4*	*6.4*	*18.2*	*5.0*	*26.0*
Sugar-beet yield (tn/ha)	*62.5*	*53.1*	*60.0*	*67.7*	*45.6*	*66.8*	*54.8*	*40.4*
Sugar-beet price (ECU/tn)	*53.1*	*58.6*	*63.6*	*62.0*	*57.5*	*44.2*	*55.0*	*56.9*
A. Sugar-beet output	**3340**	**3101**	**3833**	**4242**	**2668**	**2960**	**3075**	**2300**
Total specific costs	935	699	1089	751	887	846	682	674
Farming overheads	362	517	828	605	478	407	422	502
Depreciation	290	445	622	470	337	472	400	289
External factors	440	1128	675	639	519	239	213	384
B. Variable costs	**1348**	**1296**	**2044**	**1463**	**1737**	**1260**	**1202**	**1365**
C. Total input	**2027**	**2789**	**3215**	**2466**	**2221**	**1964**	**1717**	**1849**
D. Gross margin (=a-b)	**1992**	**1804**	**1789**	**2778**	**1056**	**1700**	**1688**	**935**
E. Net margin (=a-c)	**1313**	**312**	**618**	**1776**	**448**	**996**	**1358**	**451**

Source: FADN
Notes
(1) Germany does not include here New Länders.
(2) Variable costs are equal to Specific Costs plus Farming Overheads plus Wages. Wages are part of the category External Factors.
(3) Total input is equal to Specific Costs plus Farming Overheads plus Depreciation plus External Factors.
(4) Data are retrieved from farms, which have a large share of beet output in total farm output. The specific costs are attributed to sugar beet according to the share of beet over the total output of arable crops. Other costs are attributed to sugar beet proportional to its share over total farm output.
(5) (*) refer to farms where the output of the crop concerned represents more than 40% of the farm total output. These results should be considered as indicative.
(6) (**) & (***) refer to farms where the output of the crop concerned represents more than 50% and 66% of the farm total output, respectively.

7. Gross and net margins cross check

In order to verify the reliability of the FADN data referred to in chapters 8-12, the data have been cross-checked against other sources. First it should be noted that most national institutes are not independent from the FADN, as those are the same institutes that supply the base data for the FADN system. In the report itself (chapter 9), reference is made to AIGC-data[7]. This report provides a first cross check and it can be stated that FADN data are well in line with those from AIGC.

Apart from the AIGC study, the following sources were used as a cross-check:
▲ For Germany: KTBL (Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V.), 1997-1999
▲ For France: a case study by Saint Louis Sucre (1999)
▲ For The Netherlands: PAV (Proefstation Akkerbouw en Vollegrondsgroenten): Kwalitatieve informatie 1995-1999
▲ For the UK: unpublished MAFF DATA (1994-1995).

Those sources are independent from the FADN system and are therefore more useful as a cross-check than the data that are provided by the agencies responsible for collecting FADN data. KTBL and PAV publish annual crop budgets for all arable crops, based on well established crop models rather than on a sample survey. MAFF data are based on a sample survey.

The 1994/95 gross margin as presented by KTBL is 2859 DM/ha (table F.10). At a prevailing exchange rate of 1.8738 DM:ECU, this equals 1525 ECU/ha, whereas FADN arrives at 1360 ECU/ha (table F.7). A 10% variation seems acceptable, given the completely different methodology applied. A closer look at the data shows that the variable cost are 60% higher in the case of FADN, whereas the revenues estimates by FADN are 20% higher.

Table F.9 National data on gross margins: the case of Germany

		Income			Variable cost (DM/ha)						Gross margin (DM/ha)
Year	Prod level	Yield (t/ha)	Beet price (DM/t)	Gross income[8] (DM/ha)	Seed	Fertiliser	Plant protection	Contract work	Other	Total	
'94/	1	348,6	9,76	3472	280	346	440	667	100	1833	1639
95	2	441,1	9,76	4380	280	372	455	680	100	1888	2493
	3	491,8	9,76	4880	280	398	470	691	100	1939	2941
	4	535,6	9,76	5312	280	423	485	705	100	1994	3318
	5	590,7	9,76	5855	280	449	500	713	100	2042	3813
Average				**4780**	**280**	**398**	**470**	**691**	**100**	**1921**	**2859**

Source: KTBL (1996)

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[7] AIGC (1999): updating costs of production. Although the AIFC data are confidential, the study team was allowed to present indexed indicators. Publication of primary data was not allowed. The data sources are similar too those of FADN but as they are standardised to allow for cross-country analysis, they can be regarded as a fairly independent source.

[8] Including balance of deductions and premiums paid for by factory.

Those KTBL data are again in line with other German sources. For example, the Bayerische Landesanstalt Für Betriebswirtschaft und Agrarstructur (1999) presents similar gross margins for beet production in Bayern. For 1999, a gross margin of 4037 DM/ha is given, at a production level of 63 tonne/ha (BALIS data).

A case study of Saint Louis Sucre (related to beet production in France) may serve as an illustration of the trend in production cost in France (see table F.9). Although the costs of seeds have increased in real terms between 1985 and 1995, the costs of fertiliser and plant protection declined by 40-50% over the same period. Variable costs per hectare (in real terms) have decreased by 30% over the last ten years. If expressed in tonnes of output, the cost reductions are even more significant (more tonnes of beet produced with less inputs).

Table F.10   National data on crop margins: The case of France (1995 vs. 1985)

	1985	1995
Variable costs (constant FF/ha (1995))		
Seeds	1,060	1,400
Plant protection	1,620	940
Fertiliser	2,120	920
Total Variable costs	**4,800**	**3,260**
Variable cost change (1995 vs 1985)		
Total variable costs/ha		-32 %
Total variable costs per tonne of sugar		-43 %

Source: Chatenay (1999). Saint Louis Sucre.

At a prevailing exchange rate of 6.5251 FF:ECU, the variable cost per hectare (excluding contract work) amount to 500 ECU/hectare. This confirms France as a low cost producer, which is commonly accepted. The FADN gives substantially higher variable cost, estimated at 1430 ECU/ha. This seems to be an overestimation.

A similar approach as KTBL is followed by the PAV, the Netherlands research centre fort arable crops. Results for two years and three regions are presented below (table F.11).

Table F.11   National data on gross margins: the case of the Netherlands

	North Netherland			Flevo polders			South west Netherland		
	quantity	Price (Dfl.)	Value (Dfl./ha)	Quantity	Price (Dfl.)	Value (Dfl/ha)	Quantity	Price (Dfl.)	Value (Dfl/ha)
1997/98									
Output (net of tare)	**59500**	**0.122**	**6986**	**66000**	**0.118**	**7499**	**61500**	**0.119**	**7059**
Seed	1.1	270	297	1.1	390	429	1.1	390	429
Fertilizer			249			249			263
Crop protection			385			272			385
Other cost			207			219			222
Gross margin			**5848.3**			**6330.1**			**5760.3**
1993/94									
Output (net of tare)	**63000**	**0.116**	**7051**	**75000**	**0.113**	**8158**	**68000**	**0.112**	**7329**
Seed	1.2	255	306	1.2	375	450	1.2	255	306
Fertilizer			285			342			323
Crop protection			402			437			438
Other cost			119			145			131
Gross margin			**5939.2**			**6783.5**			**6130.5**

Source: PAV (1999).
Note: tare is estimated at average 10 tonne/ha with a cost of 27 Dfl./tonne (1997/98) and 25 Dfl./tonne (1993/94).

Unfortunately, cost estimates for contract work are not included in the data above. However, the other cost-items are well in line with those used in this study. The LEI data, which are the source data for FADN, give gross margins (excluding contract work) of Dfl. 6421 for 1997/98 and 5879 for 1993/94. Other sources estimate the cost for contract work at some 300 Dfl./ha (e.g. LEI, 1995). The Netherlands data were not used in the FADN analysis in section 6 above due to lack of data.

Data from MAFF suggest that in the case of the UK, the results of the FADN are somewhat underestimated. The following table present the average gross and net margins for sugar beet for the Eastern Counties. As example, 1995 data are presented.

Table F.12   National data on crop margins: The case of UK (94/95)

	Quantity	Price	Value (GBP/ha)
Output	**43.62**	**42.5**	**1853.85**
Seed			105.2
Fertilizer			124.5
Crop protection			153.8
Other cost variable cost			237.4
Machinery			262
gross margin			**970.95**
Labour			161
Rent			139
Overheads			91
Net Margin			**579.95**

Source: MAFF data. Summarized in Murphey, 1998 (unpublished)

At a prevailing exchange rate of 0.82879 GBP:ECU, gross and net margin equal 1170 and 700 ECU respectively. FADN data suggest that gross and net margins of 850 and

300 ECU/ha respectively are obtained. It is likely that the FADN outcomes for the UK are underestimated, as other member states arrive in 1994/95 at gross margins of ECU 1500-2000 per hectare.

8.   Structural changes in the agricultural sector in the EC

As illustrated in chapter 11 a general trend of land consolidation has taken place in all Member States since the 1960s. Since the mid-1970s, the average size of arable farms has increased by some 2.1% per year (see table F.13).

Table F.13   Scaling up of arable farms (1975-1995)

	1975	1995	Trend 75-95 (% p.a.)
Number of arable farms ('000)	1,049	1,021	-0.1%
UAA ('000 ha.)	17,678	26,055	2.0%
Av. UAA/field crop farm	16.9	25.5	2.1%

Source: EU 1999, Eurostat data.

Table F.14 shows that the total size of farms (in ha. AA) engaged in sugar beet production has increased by 0.2% per year between 1990 and 1997[9]. These figures indicate that, on average, farms engaged in beet production have increased less in size than arable farms in general.

Table F.14   Development of AA of farms engaged in sugar beet production (1990-1997)

	Total AA (ha) of beet farms				Av. AA per beet farm (ha)			
	1990	1995	1997	Av. annual change	1990	1995	1997	Av. annual change
Belgium	586,450	590,700	605,750	0.5%	32.7	38.3	41.0	**3.3%**
Denmark	444,740	484,710	506,270	1.9%	49.6	61.4	66.2	**4.2%**
France	3,310,390	3,541,360	3,614,040	1.3%	86.3	104.6	109.8	**3.5%**
Germany	5,894,800	5,630,630	5,560,700	-0.8%	96.6	106.6	110.4	**1.9%**
Greece	186,490	183,690	247,080	4.1%	8.8	8.8	10.0	**1.9%**
Ireland	246,780	257,520	235,760	-0.7%	62.5	60.9	63.0	**0.1%**
Italy	1,332,620	1,360,440	1,322,920	-0.1%	19.2	21.7	21.4	**1.6%**
Luxembourg	400	850	660	7.4%	40.0	42.5	66.0	**7.4%**
Netherlands	670,310	678,150	693,060	0.5%	31.9	35.3	36.6	**2.0%**
Portugal	3,110	2,580	1,270	-12.0%	6.4	3.2	3.6	**-7.7%**
Spain	1,345,490	1,527,270	1,520,560	1.8%	38.2	54.6	63.8	**7.6%**
UK	1,402,940	1,591,190	1,380,930	-0.2%	125.8	142.8	147.4	**2.3%**
EC-12	**15,424,520**	**15,849,090**	**15,689,000**	**0.2%**	**53.4**	**61.6**	**63.1**	*2.4%*

Source: EU Farm Structure Survey data.

Between 1983 and 1995, the decline in number of farms engaged in beet production varied from 0.6% per year in the Netherlands to 5.6% per year in Spain (see table F.15). The average decrease in the EC was 2.5% per year. The overall decrease of beet area

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[9]   A time series on the average size of farms engaged in beet production which cover the same period as the one mentioned in table F.6 is unavailable.

during the same period, was some 0.6% per annum for the EC-12 (see table F.16). The decrease was significant in Spain and Portugal (5.6% and 3% respectively), whereas Greece and Italy have experienced a moderate growth. The increase in beet area in Germany is caused by the unification with the former DDR.

Table F.15   Number of farms engaged in beet production per Member State ('000)

	1979	1983	1985	1987	1989	1993	1995	Trend '83-'95 (% p.a.)
Austria							11.8	
Belgium	22.3	19.8	19.8	19.1	17.9	16.5	15.4	-2.1%
Denmark	12.4	10.5	9.8	9.4	9.0	8.4	7.9	-2.3%
Finland							3.9	
France	49.3	46.6	44.6	43.0	38.3	35.2	33.9	-2.6%
Germany	80.4	71.7	69.4	67.0	61.0	57.0	52.9	-2.5%
Greece		26.2	23.5	16.9	21.2	23.6	21.0	-1.8%
Ireland	7.4	7.2	6.2	5.3	4.0	4.0	4.2	-4.4%
Italy	79.5	79.5	73.7	80.2	69.5	63.0	62.8	-1.9%
Netherlands	22.7	20.6	20.7	21.6	21.0	19.8	19.2	-0.6%
Portugal				1.1	0.5	0.8	0.8	
Spain		55.7		47.3	35.2	29.8	28.0	-5.6%
Sweden							5.3	
United Kingdom	14	11.8	11.5	11.1	11.2	10.5	11.1	-0.5%
EC-12								**-2.5%**

Source: Eurostat various years.

Table F.16   Development of beet area (1983 –1995) per Member State

	1983	1985	1987	1989	1993	1995	Trend '83-'95
Austria				47	53	52	
Belgium	109	118	106	106	99	99	-0.8%
Denmark	72	73	67	67	66	67	-0.6%
Finland				31	33	35	
France	490	491	446	433	441	458	-0.6%
Germany	393	403	376	383	522	513	2.2%
Greece	39	41	30	49	46	42	0.6%
Ireland	36	33	37	32	32	35	-0.2%
Italy	232	233	302	302	276	284	1.7%
Luxembourg	0	0	0	0	0	0	
Netherlands	117	131	128	124	117	116	-0.1%
Portugal	2	2	1		1	1	-5.6%
Spain	249	179	179	174	180	172	-3.0%
Sweden				51	52	58	
United Kingdom	199	202	203	194	169	196	-0.1%
EC-12	**1938**					**1810**	**-0.6%**

Source: Eurostat various years.
Note: Increase in Germany (1993) due to inclusion of new "Lander".

The average beet area per farm engaged in beet production has increased since the 1980s. Both Eurostat as FADN data support this trend, but the figures per Member State differ substantially between these two sources. On the basis of Eurostat data, the increase in beet area per farm ranges from 0.5% per annum in the Netherlands to 4.9%

per annum in Germany, with an average increase for the EC-12 of 2.0% per year over the period 1983-1995 (see table F.17). FADN arrives at a stabilisation of the beet area in the Netherlands and an increase of 7.3% in Spain over the period 1990-1997 (see table F.18).

Table F.17   Average beet area per farm engaged in beet production, Eurostat data, 1983-1995

	1983	1985	1987	1989	1993	1995	Trend 1983-95
Austria						4.41	
Belgium	5.51	5.96	5.55	5.92	6.00	6.43	1.3%
Denmark	6.86	7.45	7.13	7.44	7.86	8.48	1.8%
Finland						8.97	
France	10.52	11.01	10.37	11.31	12.53	13.51	2.1%
Germany	5.48	5.81	5.61	6.28	9.16	9.70	4.9%
Greece	1.49	1.74	1.78	2.31	1.95	2.00	2.5%
Ireland	5.00	5.32	6.98	8.00	8.00	8.33	4.3%
Italy	2.92	3.16	3.77	4.35	4.38	4.52	3.7%
Netherlands	5.68	6.33	5.93	5.90	5.91	6.04	0.5%
Portugal			0.91		1.25	1.25	
Spain	4.47	0.00	3.78	4.94	6.04	6.14	2.7%
Sweden						10.94	
United Kingdom	16.86	17.57	18.29	17.32	16.10	17.66	0.4%
EC-12	**5.54**					**7.04**	**2.0%**

Source: Eurostat various years.

Table F.18   Average beet area per farm engaged in beet production, FADN data, 1990-1997 (hectares)

	1990	**1995**	**1997**	**Average annual change (*)**
Belgium	6.0	6.4	6.5	1.2%
Denmark	7.4	8.6	9.1	2.9%
France	12.7	14.1	14.5	1.9%
Germany	9.1	9.6	10.0	1.3%
Greece	1.6	1.8	1.8	1.8%
Ireland	8.4	8.0	8.5	0.1%
Italy	3.7	4.3	4.6	3.1%
Luxembourg	1.0	1.0	1.0	0.0%
Netherlands	6.0	6.0	6.0	0.0%
Portugal	0.5	0.7	0.7	4.9%
Spain	4.3	6.6	7.1	7.3%
UK	18.0	20.6	20.9	2.1%
EC-12	7.0	7.9	8.0	1.9%

Source: FADN data.

FADN data indicate that the share of beet area in the total arable land of a farm engaged in beet production decreases slightly (see table F.19). This is not surprising because beet area decreases when yields increase and delivery rights are fixed.

Table F.19   Trend in share of beet area per farm engaged in beet production (1990-1997)

	1990	1995	1997	Average annual change (*)
Belgium	18.3%	16.6%	15.8%	-2.0%
Denmark	15.0%	14.0%	13.7%	-1.3%
France	14.7%	13.5%	13.2%	-1.6%
Germany	9.4%	9.0%	9.0%	-0.6%
Greece	18.0%	20.5%	17.9%	-0.1%
Ireland	13.5%	13.1%	13.5%	-0.1%
Italy	19.4%	19.9%	21.6%	1.6%
Luxembourg	2.5%	2.4%	1.5%	-6.9%
Netherlands	18.9%	17.1%	16.5%	-2.0%
Portugal	8.0%	22.5%	18.9%	13.0%
Spain	11.3%	12.0%	11.1%	-0.2%
UK	14.3%	14.5%	14.2%	-0.1%
EC-12	**13.1%**	**12.8%**	**12.6%**	**-0.5%**

Source: FADN data.

On the basis of the FADN data, a negative correlation can be found between the size of the holding and the degree of specialisation (defined as percentage of the arable land of a farm used for beet production). Small beet farms usually use a larger percentage of their arable land for beet production than large farms. The results of the correlation analysis are presented in table F.20. Although the data might be debatable (as 40% of arable land of a farm used for beet production seems unlikely, but could be explained by a large area of hired land), the trend seems to be clear.

Table F.20   Size of holding (AA) by share of arable land under sugar beet (averages of 1994-96)

	Share of arable land under sugar beet (% of AA)				
	<10%	10%-20%	20%-30%	30%-40%	>40%
Austria	41.9	35.6	35.6		
Denmark	79.6	44.5	49.1	51.6	
France	95.3	86.2	87.6	79.5	4.6
Germany	173.1	72.6	49.8	47.0	
Greece	15.0	10.0	7.7	6.6	2.3
Italy	32.8	21.1	16.7	12.5	3.9
Netherlands		50.5	48.0	36.0	
Spain	52.7	34.4	24.3	17.3	13.3
UK		137.0	131.0		

Source: FADN data.
Notes:
- Austria average of 1995-96;
- For other Member States insufficient entries were available for further analysis.

In summary the following conclusions can be drawn from the above presented tables:
▲ There has been a general trend of scaling up of arable farms;
▲ The average size of farms engaged in beet production has also increased over the last 20 years, but the increase is less than the increase of the average size of all arable farms;
▲ Per farm engaged in beet production, the area of beet has increased, while the percentage of beet area over arable land per farm has slightly decreased.

NEI

Annex G   Export refunds for Non-Annex I products and production refunds for the chemical and pharmaceutical industry

Export refunds for manufacturers of Non-Annex I products

In the absence of additional policy measures, the relatively high price of EC sugar would confront extra-EC exporters of sugar-containing products with a similar competitive disadvantage vis-à-vis third country products as in the case of the EC-based chemical industry. Like exports of sugar outside the EC, exports of these sugar-containing products (predominantly foods and drinks, known as Non-Annex I products) are therefore eligible for export refunds for the content of sugar contained in the exported product. The export refund is aimed at providing the exporters of sugar-containing products with a level playing field vis-à-vis their third-country competitors. Non-Annex I export refunds are fixed by a special Non-Annex I Management Committee which some independent scope of manoeuvring.

The export refund is calculated by multiplying the weight of the sugar incorporated in the product concerned - which is established for each product on the basis of a recipe code - with the lowest bid of the weekly tender for export refunds for sugar minus 30 ECU/t (see section 2.3.5 of the main report). The effective cost price of sugar used for the production of sugar-containing products exported outside the EC is therefore equal to the actual sugar price paid minus the export refund.

Production refunds for the chemical and pharmaceutical industry

Production refunds have been granted to the chemical and pharmaceutical industry since 1968, with the exception of the period 1973-75. In 1978 the system was significantly changed[10]. The list of products eligible for production refunds - and annexed to the Regulation - was extended with a number of pharmaceutical products (CN Code Chapter 30). The level of the production refunds related to the use of sugar by the chemical industry was originally linked to the price of starch. The assumption was that all products could be made using either starch or sugar (which in fact was not the case, despite technological developments).

However, for chemical products for which sugar was an essential non-substitutable ingredient, the 1978 system revision led to a considerably lower production refund and a deterioration of the level playing field for EC producers. The gap between the EC sugar price paid by the chemical industry and the world market price was from then on only marginally covered by the production refund (Sommer, 1990: 276; see annex D.1 for an overview of production refunds as from 1978/79). The changes led to a decrease in the

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[10]   Regulation (EEC) No. 1400/78.

use of sugar by the chemical industry and an increase in the use of (starch-based) glucose, and even a relocation of the sugar-using chemical industry outside the EC (Sommer, ibidem)[11].

In order to counteract these effects and to find ways to dispose of the sugar surplus, the existing production refund system for the chemical industry was again changed in 1986[12]. At the same time, the system of production refunds for the use of starch was changed. The changes implied a relatively strong improvement of the competitiveness of sugar compared to starch. From July 1986 until July 1988 a close relationship was maintained between the two systems to preclude any negative effect. During this period the production refund was determined each quarter as the difference of the gross intervention price for sugar and the price of glucose and taking into account that 1 tonne glucose can be produced out of 2 tonnes of maize. The unsure element of this system was, however, that the production refund for starch could change within the 3-month period according to changes of the cif prices of maize. As from 1988/89 onwards, therefore the production refund for sugar was calculated as follows (Sommer, 1990: 276):

▲ If the world market price per tonne of sugar plus 70 ECU/t is *higher* than the calculated equivalent glucose price, then the production refund is equal to the intervention price minus the world market minus 70 ECU/t. The 70 ECU/t is distracted because of the comparatively lower transport costs of sugar bought *within* the EC[13] and "a flat rate element intended in particular to avoid the sale at a price lower than the world market price which, by nature, is very volatile".
▲ If the world market price per tonne of sugar plus 70 ECU/t is *lower* than the calculated equivalent glucose price, then the production refund is equal to the difference between the intervention price for sugar and the price of glucose plus an additional 25-50% difference of the price of glucose and the world market price of sugar.

As from July 1990 onwards the relationship between the starch and the sugar regime for the determination of production refunds has been decoupled. The production refund level is now calculated by taking the average export refund for sugar as determined by the weekly tender results over a certain reference period, minus 70 ECU/t (in agricultural ECUs), which was changed in 1995 to 84.5 ECU/t (in financial ECUs), as a result of the phasing out of the "agricultural ECU system".

The current system of production refunds applies to the use of sugar, unprocessed isoglucose and sucrose syrups in the manufacture of, among others, glycerol (other than crude); certain organic chemicals; pharmaceutical products (lysine, antibiotics, pill coatings); organic surface-active agents; glues, enzymes; artificial resins and plastic

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[11] It should be noted that sugar could also be substituted by molasses. See also Sommer (1992).
[12] Regulation (EEC) No. 1010/86.
[13] See, e.g., Council Regulation (EEC) No 1771/90: the 7 Ecu/t corresponds "… to the forwarding costs for the export of Community sugar inclusive of a flat rate element intended in particular to avoid the sale of sale at a price lower than the world market price which, by nature, is very volatile".

materials, cellulose esters and ethers[14]. The production refund is given on the basis of the sugar actually used for the manufacture included on the list, for which extensive proof is required from the sugar-using firm applying for the production fund[15]. The refund is usually paid in the month following the determination of actual use (ex post), with a possibility of getting a down payment in advance.

While companies in the chemical and pharmaceutical industry buy their sugar usually on the basis of one-year renewable contracts, the production refund has to be seen as a specific ex-post discount on the sugar price for the chemical and pharmaceutical industry. The effective purchasing price of sugar (the net cost of sugar as an input in production) equals therefore the actual price paid minus the production refund.

The initial coupling with the glucose starch regime, enacted under the 1978 production refund regime and maintained, though in another way, until 1990, may have caused some competitive disadvantages for the sugar-using industry (Sommer 1990: 279). For products where complete substitutability between sugar and glucose applied, third country producers could, in case sugar was cheaper, make use of the full difference, while EC producers could not. The latter would get a refund based on, inter alia, the 25-50% difference between the two prices. In case of non-substitutability, sugar users were disadvantaged equally because of the coupling of the two regimes, which might be evaluated as unreasonable from the perspective of the industrial sugar users concerned. Furthermore, because of the calculation convention of 2 tonnes of maize for 1 tonne of glucose without taking into account the real conversion cost and by-product earnings, actual glucose prices might have differed from the calculated prices, with an equivalent impact on the sugar production refund. For the post-1990 period arguments related to the administrative glucose-sugar coupling do obviously not apply.

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[14] It should be noted that the artificial sweeteners sorbitol and mannitol are eligible for a production refund under the current system as from mid-1988. See Sommer, 1990: 277.

[15] The first 60,000 tonnes of production refunds are financed by the Community budget. EU budget expenditure on refunds on sugar used in the chemical industry has equalled around EUR 80 million during the last several years. The remainder which varies with the use by the chemical industry is paid out of the production levies paid by the beet growers and the sugar processing industry.

NEI

Annex H   Farmer's income: Methodology and limitations

1.   Introduction

One of the objectives of the CMO sugar was to ensure a stable income to the sugar beet producers. In the context of this study, the following questions were to be answered:

2.1   Has the common organisation of the sugar market made a lasting contribution to improving the formation of that proportion of producers' income, which results solely from the cultivation of sugar beet?

2.2   How has income from sugar beet production developed in relation to income from arable crops?

2.3   Has the common organisation of the sugar market made a lasting contribution to improving income generated by the farming activity of sugar beet producers?

2.4   What impact has the common organisation of the sugar market had on the distribution of income between different categories of sugar beet producers (in terms of size, region, degree of specialisation, etc.)?

2.5   Has the production of C sugar had a favourable impact on the formation of income of sugar beet producers?

This Annex elaborates on the methodology, indicators and data sources for these five evaluation questions. First, an overview of factors that determine farmers' income is given, followed by a section on the methodology and indicators used. The last section focuses on the quality and limitations of the available data.

2.   Determinants of farmers' income

In order to assess the impact of the CMO on farmers' incomes, it is important to realise that there are other variables that may determine a more important part of the producer's income. Among others, those factors include:

▲   The development of technology, which determines production efficiency;
▲   The development of production costs (direct inputs, farm overheads and factor cost);
▲   Profitability of substitution enterprises, mainly arable crops;
▲   Changes in subsidies, taxes etcetra;
▲   Development in farm structure (size, degree of specialisation), which affects overall farm income.

Other factors affecting the income of beet growers, for example the development of off-farm employment are not included in the scope of this study.

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3.   Methodology

The concept of farm income is not uniform. Across the member states, ministries and agencies apply various definitions and indicators for farm income. In order to make the concept operational for this study, the FADN terminology and definition is used as much as possible. FADN/RICA entails the most uniform data set to make farm results among member states comparable.

Since the family farm is the dominant mode of primary agricultural production in the EU, the producer income concept could be equated with family farm income. Family Farm Income (FFI) is equal to farm net value added minus interest, rent, wages and social security costs. In the farm net value added concept is included the remuneration of family and hired labour, own and borrowed capital and the management of the holding. Further, the Farm Net Value Added (FNVA) is also used as indicator. In order to filter out effects of farm size, FFI and FNVA were related to Family Work Unit (FWU) and Annual Working Units (AWU) respectively. Also, both indicators were related to the overall agricultural area (AA).

A comprehensive set of farm accountancy data was available for the period 1989-1996. This allowed for an indicative analysis of trends over time. In order to do so, the averaged results of 1989-1991 are compared with those of the period 1994-1996.

The FADN estimates of gross and net margins as presented in the report are derived by the following method. In the FADN database, costs are not specified per crop, but only for the farm as a whole. In order to attribute costs directly to sugar beet production, a selection is made of all farms of which beet consists of more than 50% of the overall output of the farm. Within this selection, costs are allocated according to the following rules:

Cost item	Cost item in the FADN database	Allocation key
Seeds and seedlings	Seeds and seedlings	Crop output value /total arable crops output value
Fertiliser, crop protection, fuel and other specific cost	Fertiliser, crop protection, fuel and other specific cost	Crop output value /total arable crops output value
Water	Water	Irrigated crop output value/ /output value all irrigated crops
Farming overheads	Farming overheads	Crop output value/total output value
Depreciation	Depreciation	Crop output value/total output value
Wages, rent and interest paid	Wages, rent and interest paid	Crop output value/total output value

Although FADN/RICA provides probably the best comprehensive set of data for this purpose, the system has its limitations too. Some limitations are mentioned in section 5. Whenever possible, crosschecks by using national data were carried out. However, as those national data form the input of FADN, similar limitations may apply. Besides, the

quality of the data is very heterogeneous depending on the Member State. This is for instance the reason why EUROSTAT does not publish data on crop gross margins, although they are collected at EU-level for various countries. The national data used for this study, which form the basis of the figures delivered at EUROSTAT, can therefore not provide more than a rough indication of the FADN outcomes. Among others, use was made from the following agencies:

▲ The Netherlands: Landbouw Economisch Instituut, The Hague and Praktijkonderzoek voor Akkerbouw en Vollegrondsgroenteteelt (Lelystad);
▲ Germany: KTBL (Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V.), 1997-1999 and Bundesforschungsanstalt für Landwirtschaft, Braunschweig;
▲ France: a case study by Saint Louis Sucre (1999)
▲ United Kingdom: University of Cambridge;

However, those data usually do not go further than gross margins analysis, which is useful but not sufficient in the context of this study. Those resources include: "Kwantitatieve Informatie" (Quantitative information on crop production) by the Dutch Research Station on Arable Production (PAV) and "Standarddeckungsbeiträgen, 1997-99" from the German KTBL (Kuratorium für Technik und Bauwesen in der Landwirtschaft).

4.   FADN structure and terminology

This section describes briefly the structure of FADN and its terminology used. A detailed description of the FADN can be found in the publication "Farm Accountancy Data Network, an A to Z of Methodology" of the DG agriculture.

The FADN is a survey carried out by the Member States of the European Union. It was established in 1965 and it now collects accountancy data from about 60 000 agricultural holdings. In order to extrapolate the data in the sample to all the holdings in the Union covered by the survey, a special weighting system is used. The FADN weighting system has been optimised with a view to providing good averages for groups (average family farm income on Italian wine holdings, for example) rather than good total values for groups (number of hectares under vines in Italy), the collection of the latter type of data being covered by other survey procedures.

The typology of agricultural holdings
The following community typology is applied:

a.   Economic size
Economic size of an agricultural holding is determined on the basis of its potential gross added value (total standard gross margin). The holding's economic size is expressed in European size units (ESUs). The total standard gross margin, expressed in ECU's, is divided by the ESU coefficient. The following categories have been defined:

Description	Size in ESU
Very small	< 4
Small	4 - < 8
Medium low	8 - < 16
Medium high	16 - < 40
Large	40 - < 100
Very large	>= 100

b.   Specialisation

Specialisation is determined on the basis of the contributions of the different lines of production to the total standard gross margin. The following types of specialisation are applied:

Type of specialisation	Grouping of TF on the basis of principal types of farming	
Field crops	13	Specialist cereals (COP)
	14	General field cropping
	60	Mixed cropping
Horticulture	20	Specialist horticulture
Wine	31	Specialist vineyards
Permanent crops	32	Specialist fruit and citrus fruit
	33	Specialist olives
	34	Various permanent crops combined
Milk	41	Specialist dairying
Grazing	42	Specialist cattle – rearing and fattening
livestock	43	Specialist cattle – dairying, rearing and fattening combined
	44	Sheep, goats and other grazing livestock
Granivores	50	Specialist granivores
Mixed	71	mixed livestock, mainly grazing livestock
	72	Mixed livestock, mainly granivores
	81	field crops – grazing livestock combined
	82	Various crops and livestock combined

The category of so-called arable farms (also called field crop farms), which forms the sub-sample, which is used in the analysis in the Chapters 8-12, is composed of two sub-categories: 13 and 14:

| 13: Specialist cereals (COP): | Specialised in Cereals, Oilseeds, Proteins (i.e. sum of cereals, oilseeds and protein standard gross margin (SGM) > 2/3 of farm SGM. |
| 14: General field cropping: | Standard Gross Margin (SGM) for General cropping > 2/3 of farm SGM. Cereals, oilseeds, protein crops SGM <= 2/3 of farm SGM. |

FADN glossary

A glossary of FADN terminology as applied in this study is presented below.

Structure and yield per holding

Economic size – ESU	Economic size of holding expressed in European size units. On the basis of the Community typology.
Labour input – AWU	Total labour input of holding expressed in annual work units = full-time person equivalents.
Utilised agricultural area – ha	Total utilised agricultural area of holding. Does not include areas used for mushrooms, land rented for less than one year, woodland and the other farm areas (roads, ponds, non-farmed areas, etc.). It is made up of land in owner occupation, rented land, land in share-cropping (remuneration linked to output from land made available). It includes agricultural land temporarily not under cultivation for agricultural reasons or as a result of being withdrawn from production as part of agricultural policy measures.

Output

:output cereals	Values are recorded after deduction of the co-responsibility levy (if any) on cereals.
:output sugar beet	Not including the value of tops but including that of pulp returned to the holder or sold by him to the sugar beet factory. Sugar beet tops are entered as a separate item. Products returned to the farm are included in the sum of beet sales, and they should also be included in the cost: dried pulp as concentrated feedstuff (item 264), fresh pulp as course fodder (item 265). When pulp is not returned, the value is included in the value of the beet sales. The quantity of sugar beets produced is exclusive the tare of tops. Prices relate to the average price that farmer obtains for its output, it does not separate A, B and C beet.

Farm costs

Total costs	= Specific costs + Overheads + Depreciation + External factors. Costs linked to the agricultural activity of the holder and relating to the output of the accounting year. Farm costs relate to the "consumption" of productive resources (including farm use) during the accounting year. Expenditures for private use are excluded. The cost related to the "consumption" of capital assets is represented by depreciation. Hence, expenditure of capital acquisition is excluded. Costs, which are reimbursed, even after closure of the accounting year, are excluded too. Grants and subsidies related to cost are not deducted, but entered as an income. Included are amounts relating to inputs produced on the holding (farm use) = seeds and seedlings and feed for grazing stock and granivores, but not manure. When calculating FADN standard results, farm taxes and other dues are not included in the total for costs but are taken into account in the balances with the State (subsidies - taxes) on current and non-current operations. The personal taxes of the holder are not to be recorded in the FADN accounts.
Intermediate consumption	= Specific costs + Overheads
Specific costs	= Crop-specific inputs (seeds and seedlings, fertilisers, crop protection products, other specific crop costs), livestock-specific inputs (feed for grazing stock and granivores, other specific livestock costs) and specific forestry costs.
Overheads	Supply costs linked to productive activity but not linked to specific lines of production.
:upkeep of buildings & equipment	Costs of current upkeep of equipment (and purchase of minor equipment), car expenses, current upkeep of buildings and land improvements, insurance of buildings. Major repairs are considered as investments.

:energy	Motor fuels and lubricants, electricity, heating fuels.
:contract work	Costs linked to work carried out by contractors and to the hire of machinery.
:other non-specific costs	Water, insurance (except for buildings and accidents at work) and other farming overheads (accountants' fees, telephone charges, etc.).
Depreciation	Entry in the accounts of depreciation of capital assets over the accounting year. It is determined on the basis of the replacement value. Concerns plantations of permanent crops, farm buildings and fixed equipment, land improvements, machinery and equipment and forest plantations. There is no depreciation of land and circulating capital.
External factors	Remuneration of inputs (work, land and capital) which are not the property of the holder. (= wages, rent and interest paid)
:Wages paid	Wages and social security charges (and insurance) of wage earners. Amounts received by workers considered as unpaid workers (wages lower than a normal wage) are excluded.
:Rent paid	Rent paid for farmland and buildings and rental charges.
:Interest paid	Interest and financial charges paid on loans obtained for the purchase of land, buildings, machinery and equipment, livestock, circulating capital, and interest and financial charges on debts. Interest subsidies are to be deducted.

Subsidies

Compensatory payments	Amounts paid to producers of cereals, oilseeds and protein crops (COP crops) as a result of the fall in prices as part of the 1992 reform of the CAP.

Income per holding

Total output	Sales and use of (crop and livestock) products and livestock + change in stocks of (crop and livestock) products + change in valuation of livestock - purchases of livestock + various non-exceptional products
Intermediate consumption	Specific supply costs (including inputs produced on the holding) and overheads arising from production in the accounting year.
Balance farm subsidies & taxes	Subsidies and taxes arising from current productive activity in the accounting year.
Gross farm income	Output - Intermediate consumption + Balance farm subsidies & taxes
Depreciation	Depreciation of capital assets estimated at replacement value.
Farm Net Value Added	Corresponds to the payment for fixed factors of production (work, land and capital), whether they are external or family factors. As a result, holdings can be compared irrespective of the family/non-family nature of the factors of production employed. This indicator is sensitive, however, to the production methods employed: the ratio (intermediate consumption + depreciation)/fixed factors may vary and therefore influence the FNVA level. For example, in the livestock sector, if production is mostly without the use of land (purchased feed) or extensive (purchase and renting of forage land).
External factors	Wages (and other costs) paid, rent (and other costs) paid and interest (after deduction of interest subsidies) paid. Payment for contract work is included in intermediate consumption (overheads).

Family Farm Income	Corresponds to the payment for family fixed factors of production (work, land and capital) and the payment for the entrepreneur's risks (loss/profit) in the accounting year. The standard FADN results do not therefore use estimations of the payment for family factors (costs imputed for work, land and family capital).
Income per person	
Farm Net Value Added/ AWU	Farm Net Value Added expressed per agricultural work unit. Takes into account any differences in the labour force to be remunerated per holding.
Family Farm Income/FLU	Family Farm Income expressed per family labour unit. Takes into account any differences in the family labour force to be remunerated per holding.

5.   Limitations to the use of FADN data

As no data source is perfect for each and every purpose, FADN has its limitations. In the context of this study, the most important ones were:
- ▲ FADN does not collect specific cost per crop. The revenues are collected for each farm enterprise separately, but costs are only presented for the farm as a whole, or, as far as specific cost are concerned, aggregated for all crops together;
- ▲ The agricultural holdings from which the accounting data are obtained are not chosen on the basis of representativeness criteria, but within the agricultural development systems at a regional level, which the farms join spontaneously. Participation in FADN is on a voluntary basis. Most likely, there is a bias towards more "advanced" and "larger" farms. Furthermore, the farm sample is not constant, as farmers may decide to withdraw from the network;
- ▲ As the FADN database changed significantly in 1989, results from before than time are difficult to compare with present results. Yet time series are not reliable.
- ▲ FADN sample does not cover the entire farm population. Small farms are excluded.

Annex J Beet production indicators per region

	Beet growing farms as % of total number of farms	Agric. area of beet farms as % of total agric. area	Beet area as % of total agric. area	Beet yield (t/ha)
EC – 15	3,8%	13,0%	1,7%	
Picardie	53,6%	83,0%	12,5%	72,5
Nord-Pas-de-Calais	45,3%	68,8%	7,8%	75,7
East Anglia	37,8%	65,1%	10,9%	56,6
Île-de-France	30,8%	50,9%	8,2%	75,2
Sydsverige	30,6%	58,4%	9,4%	44,5
Sachsen-Anhalt	30,3%	74,7%	5,1%	34,7
Région Wallone	29,4%	49,8%	8,1%	68,8
Zuid-Nederland	24,3%	41,8%	6,7%	55,3
Mecklenburg-Vorpommern	22,6%	63,7%	2,5%	39,2
Noord-Nederland	22,6%	36,4%	6,0%	53,5
Champagne-Ardenne	22,4%	47,7%	6,2%	75,7
West-Nederland	18,3%	40,9%	6,5%	60,6
Vlaams gewest en Brussel	18,2%	36,7%	5,6%	67,6
Anatoliki Makedonia kai Thraki	17,1%	31,5%	4,9%	64,7
Haute-Normandie	16,7%	37,9%	3,7%	76,5
Marche	15,5%	29,0%	8,2%	37,9
East Midlands	14,5%	30,4%	3,7%	56,6
Niedersachsen	14,1%	31,4%	4,9%	53,1
Castilla-León	14,0%	17,9%	1,6%	60,8
Emilia Romagna	13,8%	30,3%	6,2%	44,8
Ostösterreich	13,4%	34,5%	3,7%	58,1
Danmark	12,1%	18,8%	2,6%	48,8
Nordrhein-Westfalen	11,7%	27,5%	5,0%	57,4
Yorkshire and Humberside	9,8%	20,5%	2,3%	56,6
Hessen	9,6%	24,6%	2,6%	52,9
Sachsen	9,2%	48,7%	2,1%	39,3
Thuringen	9,2%	48,6%	1,6%	34,3
Oost-Nederland	9,1%	21,8%	3,9%	64,5
Rheinland-Pfalz	8,9%	20,9%	3,2%	52,8
Bayern	8,6%	18,6%	2,3%	60,4
Etalä-Suomi	7,6%	12,1%	2,9%	38,8
Kentriki Makedonia	7,1%	12,4%	2,6%	55,4
Veneto	6,9%	25,1%	5,1%	60,1
Brandenbourg	6,4%	31,3%	0,9%	37,4
Lombardia	5,7%	13,4%	3,0%	55,7
Schleswig-Holstein	5,1%	15,8%	1,5%	50,9
Baden-Württemberg	5,1%	13,4%	1,5%	52,8
Småland med öarna	5,0%	13,2%	1,5%	37,7
La Rioja	4,8%	10,0%	1,6%	54,8
Centre	4,5%	8,1%	1,3%	76,1
West Midlands	4,2%	12,2%	1,8%	56,6
Alsace	3,9%	12,2%	1,7%	72,6
Thessalia	3,8%	9,0%	1,5%	59,8
Molise	3,4%	9,4%	3,0%	42,1
Basse-Normandie	2,8%	9,1%	0,8%	77,1
Dytiki Makedonia	2,8%	5,0%	1,2%	48,0
Abruzzi	2,6%	4,6%	1,0%	31,0
Ireland	2,5%	5,4%	0,7%	43,6
Bourgogne	2,3%	5,1%	0,5%	68,7
Pais Vasco	2,3%	9,8%	1,6%	59,2
Westösterreich	2,2%	3,6%	0,5%	60,2
Piemonte	2,0%	6,8%	1,4%	56,5
Açores	1,9%	1,1%	0,2%	42,8

Auvergne	1,8%	3,7%	0,3%	67,4
Friuli-Venezia Giulia	1,8%	16,8%	2,2%	64,5
Andalucía	1,7%	7,0%	1,2%	48,2
Toscana	1,4%	6,6%	1,2%	46,8
Umbria	1,4%	8,9%	1,6%	47,3
Lazio	1,2%	3,7%	0,9%	45,3
Franche-Comté	1,1%	2,4%	0,2%	64,5
South East	1,1%	3,5%	0,3%	56,6
Sardegna	1,1%	2,1%	0,3%	42,3
Puglia	1,0%	5,3%	1,2%	38,7
Itä-Suomi	0,9%	1,4%	0,4%	38,8
Castilla-La Mancha	0,8%	3,4%	0,3%	56,4
Sterea Ellada	0,7%	1,9%	0,4%	55,3
Väli-Suomi	0,7%	1,2%	0,3%	38,8
Västsverige	0,7%	2,0%	0,1%	37,7
North West	0,6%	1,6%	0,2%	56,6
Asturias	0,6%	0,7%	0,0%	50,0
Calabria	0,5%	2,3%	0,4%	29,8
Extremadura	0,4%	0,5%	0,1%	45,0
Luxembourg	0,3%	0,5%	0,0%	50,0
Basilicata	0,3%	1,2%	0,2%	39,4
Bolzano-Bozen	0,2%	0,2%	0,0%	60,6
Campania	0,2%	0,5%	0,2%	57,4
South West	0,1%	0,6%	0,1%	56,6
Navarra	0,1%	0,1%	0,0%	42,3
Pays-de-la-Loire	0,1%	0,3%	0,0%	75,5
Lorraine	0,1%	0,7%	0,0%	53,0
Aragón	0,1%	0,0%	0,0%	51,1
Südösterreich	0,1%	0,1%	0,0%	51,7
Rhône-Alpes	0,1%	0,3%	0,0%	56,0

Source: Eurostat – Eurofarm Survey 1997.

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Annex K Background information on degree of specialisation in beet production

Table K.1 presents the average beet and sugar yields per Member State over the period 1995/96-1998/99. France is the absolute front-runner in terms of sugar yield per hectare followed by Belgium, Austria, the Netherlands and the UK. All other Member States have sugar yield per hectare below the EC average. Finland has the lowest yield per hectare (42% of average yield in France), followed by Italy, Ireland, Greece and Sweden.

Table K.1   Beet and sugar yields per hectare in the Member States (in tonnes per hectare, averages of 1995/96-1998/99)

	Beet yields per ha	Sugar contents of beet	Sugar yields per ha
Austria	**60,83**	**17,08%**	**8,93**
Belgium	**59,25**	16,78%	**8,97**
Denmark	47,40	**17,25%**	7,48
Finland	31,55	16,65%	4,33
France	**59,10**	**18,10%**	**10,32**
Germany	51,40	**17,43%**	7,86
Greece	**57,55**	14,38%	6,48
Ireland	42,70	16,07%	6,46
Italy	45,58	14,78%	5,93
Netherlands	**55,25**	15,86%	**8,44**
Spain	52,03	16,64%	7,31
Sweden	43,13	**17,42%**	6,62
UK	52,98	**17,26%**	**8,43**
EC-15 (without Portugal)	53,15	16,97%	8,08

Source: CEFS, Sugar statistics 1999, p.5 (beet yields), p.6 (sugar content) and DG Agriculture, Final production tables (sugar yields).
Note: Figures above the EC average are shown in bold.

In table K.2 three indicators of regional specialisation of beet production are presented: (i) beet area as percentage of total agricultural area, (ii) the value of beet production as percentage of the value of total agricultural output, and (iii) the number of beet growing farms as percentage of the total number of farms. The first indicator is considered as the best indicator of regional specialisation, because it refers to the utilisation of a primary factor of production (land). Belgium, the Netherlands, and to a lesser extent Germany and Denmark rank highest according to this indicator. Of these countries, only Belgium and the Netherlands are included in the category of Member States with the highest sugar yields.

Table K.2   Sugar beet specialisation indicators in the EC Member States

	Beet area as % of UAA (1)	Sugar beet production value as % of total agricultural production value (2)	Beet holdings as % of total number of holdings (3)
Austria	1.5%	**3.8%**	**5.0%**
Belgium	**7.4%**	**4.9%**	**20.8%**
Denmark	**2.5%**	2.3%	**11.1%**
Finland	**1.6%**	**2.9%**	3.4%
France	1.4%	**2.7%**	**4.5%**
Germany	**2.9%**	**4.0%**	**8.9%**
Greece	1.5%	2.3%	3.1%
Ireland	0.8%	1.7%	2.4%
Italy	**1.9%**	2.0%	2.5%
Netherlands	**6.2%**	2.2%	**16.8%**
Portugal	0.1%	1.4%	0.1%
Spain	0.5%	1.5%	1.9%
Sweden	**1.9%**	**3.9%**	**5.6%**
UK	1.1%	2.2%	**4.0%**
EU-15	1.5%	2.6%	3.6%

Sources: (1) DG Agriculture, Agricultural statistics, table 3.1.1 (1997). DG Agriculture, Agricultural statistics, tables 2.0.1.2 (1997) and 4.3.1.1 (1997-98). (3) Eurostat, Eurofarm survey data, 1997.

Note: Figures in bold are above the EC-average.

The correlation between sugar yield per hectare (table K.1, last column) and the percentage of agricultural land used for beet cultivation per Member State (table K.2, first column) was found to be low and statistically insignificant. The absence of a statistically significant correlation is most likely caused by the fact that in a number of Member States beet production is concentrated in certain regions of the country. Such a country might have a high sugar yield per hectare, but a low percentage of agricultural land used for beet production (because beets is only grown in certain regions of the country), which is for instance the case in France. France has a high sugar yield per hectare, while the beet production is almost entirely concentrated in the North of France

The correlation between sugar yields and intensity of beet growing (percentage of agricultural land used for beet growing) has also been studied at a more disaggregated level. For this purpose, data of the 1997 Eurofarm Survey (Eurostat) have been used which provides beet production data at the level of 83 regions in the EC[16]. Correlation analyses between the percentage of agricultural land used for beet production and the sugar yields per hectare[17] at the level of the regions were performed for the EC as a whole and for a number of individual Member States.

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[16]   For basic data see annexes H and K and chapter 17.
[17]   Sugar yields per hectare have been calculated on the basis of the share (ratio) of each region in the total beet production of the Member State. That ratio is multiplied with the total sugar production in the Member State in order to find the quantity of sugar produced in the region concerned (assuming the sugar content of beets all over the Member State). That quantity of sugar is divided by the number of hectares in the region concerned in order to find the sugar yield per hectare.

For the EC as a whole a statistically significant positive correlation was found, but the degree of correlation is rather low (R square of 0.0893, which means that only 8.9% of the deviation of the ratio 'beet area/UAA' from the average ratio 'beet area/UAA' can be explained by the sugar yield per hectare. Thus relatively high yields have not played a big role in regional specialisation. Other factors must have played in much bigger role as driving forces for regional specialisation.

At the level of the Member States, an analysis could only be made for Germany, France, Italy and Spain, because the number of data regarding the other Member States was insufficient. The correlation as measured by the explained variance (R square statistic) was very weak for Italy and Germany (0 respectively 0.04). A much stronger correlation was found for France (0.18) and Spain (0.33). In all cases the estimated regression coefficients were statistically significant.

The conclusion is that the correlation between yields and specialisation is fairly strong in Spain and France, but rather weak at the level of the entire EC and almost non-existent in Italy and Germany. Thus no clear evidence was found of an adequate distribution of sugar beet production (measured in terms of specialisation) and comparative advantage in beet production.

Annex L   Data on regional development and sugar beet production

In table L.1 all 130 regions are listed, as well as the number of beet holdings, the agricultural area, the beet area per region and whether or not the region is an 'objective 1 region' (see asterisk).

Table L.1   Characteristics of agricultural holdings and beet production per region (data of 1997)

	Region	# agric. Holdings	Agric. area (ha)	# beet holdings	Agric. area of beet holdings (ha)	Area sugar beet (ha)	% beet holdings	% of agric. area held by beet holdings	% of agric. area of region covered with beet	% of agric. area of beet holdings covered with beet
	EUR15	6,990,710	128,710,390	268,040	16,689,550	2,130,450	3.8%	13.0%	1.7%	12.8%
	Niedersachsen	74,760	2,674,490	10,540	841,070	129,980	14.1%	31.4%	4.9%	15.5%
	Bayern	174,410	3,342,290	15,080	622,910	77,630	8.6%	18.6%	2.3%	12.5%
	Nordrhein-Westfalen	66,350	1,531,330	7,790	421,870	76,110	11.7%	27.5%	5.0%	18.0%
*	**Sachsen-Anhalt**	**5,150**	**1,165,900**	**1,560**	**870,410**	**59,490**	**30.3%**	**74.7%**	**5.1%**	**6.8%**
*	**Mecklenburg-Vorpommern**	**5,210**	**1,349,860**	**1,180**	**860,080**	**33,760**	**22.6%**	**63.7%**	**2.5%**	**3.9%**
	Rheinland-Pfalz	38,410	718,320	3,430	149,870	23,030	8.9%	20.9%	3.2%	15.4%
	Baden-Wuerttemberg	87,300	1,447,220	4,440	194,620	22,040	5.1%	13.4%	1.5%	11.3%
	Hessen	34,650	775,020	3,320	190,280	20,430	9.6%	24.6%	2.6%	10.7%
*	**Sachsen**	**8,460**	**895,730**	**780**	**436,010**	**18,480**	**9.2%**	**48.7%**	**2.1%**	**4.2%**
	Schleswig-Holstein	24,190	1,038,020	1,240	163,630	15,230	5.1%	15.8%	1.5%	9.3%
*	**Thuringen**	**5,550**	**801,060**	**510**	**389,210**	**13,150**	**9.2%**	**48.6%**	**1.6%**	**3.4%**
*	**Brandenbourg**	**7,640**	**1,345,750**	**490**	**420,740**	**12,560**	**6.4%**	**31.3%**	**0.9%**	**3.0%**
	Saarland	2,200	73,040	0	0	0	0.0%	0.0%	0.0%	
**	*Hambourg, Bremen, Berlin (insgesamt)**	*1,650*	*21,580*	*0*	*0*	*0*	*0.0%*	*0.0%*	*0.0%*	
	DEUTSCHLAND	535,930	17,179,610	50,360	5,560,700	501,890	9.4%	32.4%	2.9%	9.0%
	Picardie	17,370	1,357,410	9,310	1,126,650	170,000	53.6%	83.0%	12.5%	15.1%
	Champagne-Ardenne	26,260	1,601,100	5,880	764,430	99,760	22.4%	47.7%	6.2%	13.1%
**	*Nord-Pas-de-Calais*	*18,570*	*848,630*	*8,410*	*583,480*	*66,610*	*45.3%*	*68.8%*	*7.8%*	*11.4%*
	Ile-de-France	6,360	588,910	1,960	299,730	48,420	30.8%	50.9%	8.2%	16.2%
	Centre	35,580	2,398,880	1,590	193,310	30,400	4.5%	8.1%	1.3%	15.7%
	Haute-Normandie	16,030	799,850	2,670	303,350	29,330	16.7%	37.9%	3.7%	9.7%
	Basse-Normandie	38,150	1,279,710	1,060	116,750	9,800	2.8%	9.1%	0.8%	8.4%
	Bourgogne	25,830	1,795,460	600	91,900	8,980	2.3%	5.1%	0.5%	9.8%
	Alsace	14,720	347,780	580	42,270	6,040	3.9%	12.2%	1.7%	14.3%
	Auvergne	31,330	1,547,600	570	57,570	4,530	1.8%	3.7%	0.3%	7.9%
	Franche-Comte	12,700	672,010	140	15,990	1,280	1.1%	2.4%	0.2%	8.0%
	Pays-de-la-Loire	57,020	2,190,860	70	7,040	470	0.1%	0.3%	0.0%	6.7%
	Lorraine	17,160	1,130,710	20	7,360	380	0.1%	0.7%	0.0%	5.2%
	Rhone-Alpes	58,370	1,601,030	40	4,210	310	0.1%	0.3%	0.0%	7.4%
	Bretagne	57,100	1,783,960	0	0	0	0.0%	0.0%	0.0%	
	Poitou-Charentes	35,610	1,803,720	0	0	0	0.0%	0.0%	0.0%	
	Aquitaine	56,730	1,515,410	0	0	0	0.0%	0.0%	0.0%	
	Midi-Pyrenees	63,160	2,361,750	0	0	0	0.0%	0.0%	0.0%	
	Limousin	19,690	891,860	0	0	0	0.0%	0.0%	0.0%	
	Languedoc-Roussillon	41,440	1,031,860	0	0	0	0.0%	0.0%	0.0%	
	Provence-Alpes-Cote-dAzur"	28,080	672,200	0	0	0	0.0%	0.0%	0.0%	
*	**Corse**	**2,630**	**110,640**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	FRANCE	679,890	28,331,340	32,900	3,614,040	476,310	4.8%	12.8%	1.7%	13.2%
	Emilia Romagna	119,780	1,192,650	16,560	361,710	73,710	13.8%	30.3%	6.2%	20.4%
	Marche	71,620	588,620	11,080	170,730	48,040	15.5%	29.0%	8.2%	28.1%
	Veneto	181,020	868,490	12,480	217,720	43,900	6.9%	25.1%	5.1%	20.2%

	Region	# agric. Holdings	Agric. area (ha)	# beet holdings	Agric. area of beet holdings (ha)	Area sugar beet (ha)	% beet holdings	% of agric. area held by beet holdings	% of agric. area of region covered with beet	% of agric. area of beet holdings covered with beet
	Lombardia	100,870	1,111,150	5,740	149,320	33,370	5.7%	13.4%	3.0%	22.3%
*	**Puglia**	**300,610**	**1,431,100**	**2,920**	**76,020**	**17,820**	**1.0%**	**5.3%**	**1.2%**	**23.4%**
	Piemonte	122,460	1,169,600	2,430	79,280	16,700	2.0%	6.8%	1.4%	21.1%
	Toscana	92,890	902,110	1,310	59,430	10,490	1.4%	6.6%	1.2%	17.7%
*	**Molise**	**36,100**	**243,190**	**1,230**	**22,810**	**7,320**	**3.4%**	**9.4%**	**3.0%**	**32.1%**
	Lazio	179,180	821,250	2,110	30,780	7,210	1.2%	3.7%	0.9%	23.4%
	Umbria	45,180	391,840	630	34,910	6,120	1.4%	8.9%	1.6%	17.5%
	Friuli-Venezia Giulia	48,640	260,200	860	43,710	5,750	1.8%	16.8%	2.2%	13.2%
*	**Abruzzi**	**94,340**	**502,980**	**2,410**	**23,200**	**5,130**	**2.6%**	**4.6%**	**1.0%**	**22.1%**
*	**Sardegna**	**83,610**	**1,327,620**	**880**	**27,460**	**4,580**	**1.1%**	**2.1%**	**0.3%**	**16.7%**
*	**Calabria**	**152,030**	**649,870**	**750**	**14,720**	**2,920**	**0.5%**	**2.3%**	**0.4%**	**19.8%**
*	**Campania**	**201,410**	**632,750**	**310**	**3,220**	**1,120**	**0.2%**	**0.5%**	**0.2%**	**34.8%**
*	**Basilicata**	**68,550**	**597,030**	**200**	**7,350**	**980**	**0.3%**	**1.2%**	**0.2%**	**13.3%**
	Bolzano-Bozen	21,930	265,810	40	550	10	0.2%	0.2%	0.0%	1.8%
	Valle d'Aosta	7,210	87,120	0	0	0	0.0%	0.0%	0.0%	
	Liguria	34,980	80,870	0	0	0	0.0%	0.0%	0.0%	
*	**Sicilia**	**328,830**	**1,564,800**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	Trento	23,980	144,060	0	0	0	0.0%	0.0%	0.0%	
	ITALIA	2,315,220	14,833,110	61,940	1,322,920	285,170	2.7%	8.9%	1.9%	21.6%
	Noord-Nederland	17,520	569,000	3,960	207,310	34,320	22.6%	36.4%	6.0%	16.6%
	West-Nederland	29,160	491,290	5,330	200,860	32,040	18.3%	40.9%	6.5%	16.0%
	Zuid-Nederland	27,010	388,560	6,550	162,570	26,050	24.3%	41.8%	6.7%	16.0%
**	*Oost-Nederland*	*34,230*	*561,660*	*3,120*	*122,320*	*21,660*	*9.1%*	*21.8%*	*3.9%*	*17.7%*
	NEDERLAND	107,920	2,010,510	18,960	693,060	114,070	17.6%	34.5%	5.7%	16.5%
**	*Region Wallone*	*22,720*	*751,600*	*6,670*	*374,140*	*60,550*	*29.4%*	*49.8%*	*8.1%*	*16.2%*
	Vlaams gewest en Brussel	44,470	631,140	8,090	231,610	35,230	18.2%	36.7%	5.6%	15.2%
	BELGIQUE/BELGIE	67,190	1,382,740	14,760	605,750	95,780	22.0%	43.8%	6.9%	15.8%
	LUXEMBOURG	2,980	126,630	10	660	10	0.3%	0.5%	0.0%	1.5%
	East Anglia	11,420	953,850	4,320	620,650	103,700	37.8%	65.1%	10.9%	16.7%
	East Midlands	15,800	1,185,440	2,290	360,670	44,170	14.5%	30.4%	3.7%	12.2%
**	*Yorkshire and Humberside*	*16,040*	*1,057,870*	*1,570*	*216,440*	*24,590*	*9.8%*	*20.5%*	*2.3%*	*11.4%*
	West Midlands	18,870	909,890	800	111,110	16,590	4.2%	12.2%	1.8%	14.9%
	South East	24,470	1,515,790	260	53,520	5,120	1.1%	3.5%	0.3%	9.6%
	South West	35,600	1,708,510	50	10,660	910	0.1%	0.6%	0.1%	8.5%
	North West	11,180	420,360	70	6,650	680	0.6%	1.6%	0.2%	10.2%
**	*Wales*	*27,940*	*1,419,690*	*10*	*1,230*	*100*	*0.0%*	*0.1%*	*0.0%*	*8.1%*
	Scotland	32,890	4,972,620	0	0	0	0.0%	0.0%	0.0%	
	Northern Ireland	27,550	1,019,510	0	0	0	0.0%	0.0%	0.0%	
	North	11,400	1,005,340	0	0	0	0.0%	0.0%	0.0%	
	UNITED KINGDOM	233,160	16,168,870	9,370	1,380,930	195,860	4.0%	8.5%	1.2%	14.2%
*	**IRELAND**	**147,830**	**4,342,380**	**3,740**	**235,760**	**31,710**	**2.5%**	**5.4%**	**0.7%**	**13.5%**
	DANEMARK	63,150	2,688,560	7,650	506,270	69,490	12.1%	18.8%	2.6%	13.7%
*	**Anatoliki Makedonia kai Thraki**	**66,100**	**363,490**	**11,280**	**114,490**	**17,660**	**17.1%**	**31.5%**	**4.9%**	**15.4%**
*	**Kentriki Makedonia**	**122,510**	**614,150**	**8,730**	**76,210**	**15,950**	**7.1%**	**12.4%**	**2.6%**	**20.9%**
*	**Thessalia**	**82,350**	**436,920**	**3,130**	**39,180**	**6,660**	**3.8%**	**9.0%**	**1.5%**	**17.0%**
*	**Dytiki Makedonia**	**32,640**	**208,920**	**900**	**10,370**	**2,510**	**2.8%**	**5.0%**	**1.2%**	**24.2%**
*	**Sterea Ellada**	**82,440**	**349,720**	**600**	**6,590**	**1,540**	**0.7%**	**1.9%**	**0.4%**	**23.4%**
*	**Attiki**	**21,760**	**56,840**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Notio Aigaio**	**22,270**	**103,300**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Voreio Aigaio**	**32,410**	**123,210**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Dytiki Ellada**	**91,190**	**324,500**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Peloponnisos**	**102,250**	**376,540**	**10**	**210**	**0**	**0.0%**	**0.1%**	**0.0%**	**0.0%**
*	**Nisia Ioniou**	**28,120**	**81,290**	**10**	**30**	**0**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
*	**Ipeiros**	**49,070**	**115,310**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Kriti**	**88,280**	**344,460**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	ELLADA	821,390	3,498,650	24,660	247,080	44,320	3.0%	7.1%	1.3%	17.9%
*	**Andalucia**	**274,140**	**4,911,020**	**4,550**	**344,490**	**59,000**	**1.7%**	**7.0%**	**1.2%**	**17.1%**
*	**Castilla-Leon**	**117,540**	**5,333,470**	**16,420**	**952,390**	**86,210**	**14.0%**	**17.9%**	**1.6%**	**9.1%**
*	**Castilla-La Mancha**	**133,270**	**4,716,070**	**1,080**	**161,390**	**14,880**	**0.8%**	**3.4%**	**0.3%**	**9.2%**
	Pais Vasco	22,720	238,780	520	23,390	3,770	2.3%	9.8%	1.6%	16.1%
	La Rioja	12,920	220,300	620	22,020	3,560	4.8%	10.0%	1.6%	16.2%

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	Region	# agric. Holdings	Agric. area (ha)	# beet holdings	Agric. area of beet holdings (ha)	Area sugar beet (ha)	% beet holdings	% of agric. area held by beet holdings	% of agric. area of region covered with beet	% of agric. area of beet holdings covered with beet
*	**Extremadura**	**68,400**	**2,885,300**	**300**	**13,100**	**1,850**	**0.4%**	**0.5%**	**0.1%**	**14.1%**
	Navarra	23,090	579,240	30	390	110	0.1%	0.1%	0.0%	28.2%
*	**Asturias**	**39,920**	**401,310**	**240**	**2,610**	**50**	**0.6%**	**0.7%**	**0.0%**	**1.9%**
	Aragon	60,360	2,537,580	60	730	10	0.1%	0.0%	0.0%	1.4%
	Baleares	17,360	234,490	0	0	0	0.0%	0.0%	0.0%	
*	**Canarias**	**15,120**	**49,930**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Cantabria**	**16,400**	**229,320**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	Cataluna	68,940	1,140,480	0	0	0	0.0%	0.0%	0.0%	
*	**Galicia**	**114,780**	**621,550**	**10**	**50**	**0**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
	Madrid	10,640	319,230	0	0	0	0.0%	0.0%	0.0%	
*	**Murcia**	**47,390**	**511,250**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Communidad Valenciana**	**165,260**	**700,800**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	ESPAÑA	1,208,250	25,630,120	23,830	1,520,560	169,440	2.0%	5.9%	0.7%	11.1%
*	**Acores**	**18,060**	**114,650**	**350**	**1,270**	**240**	**1.9%**	**1.1%**	**0.2%**	**18.9%**
*	**Centro**	**123,060**	**614,950**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Lisboa e Vale do Tejo**	**64,870**	**494,430**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Norte**	**143,150**	**705,680**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Alentejo**	**34,720**	**1,757,360**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Algarve**	**15,990**	**127,750**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
*	**Madeira**	**16,840**	**7,320**	**0**	**0**	**0**	**0.0%**	**0.0%**	**0.0%**	
	PORTUGAL	**416,690**	**3,822,140**	**350**	**1,270**	**240**	**0.1%**	**0.0%**	**0.0%**	**18.9%**
**	*Ostosterreich*	*70,060*	*1,162,550*	*9,410*	*400,670*	*42,880*	*13.4%*	*34.5%*	*3.7%*	*10.7%*
	Westosterreich	73,880	1,415,820	1,650	50,580	6,930	2.2%	3.6%	0.5%	13.7%
	Sudosterreich	66,160	836,720	50	1,180	180	0.1%	0.1%	0.0%	15.3%
	ÖSTERREICH	210,100	3,415,090	11,110	452,430	49,990	5.3%	13.2%	1.5%	11.0%
	Etela-Suomi-Uusimaa	41,280	1,121,960	3,130	135,900	33,010	7.6%	12.1%	2.9%	24.3%
**	*Vali-Suomi*	*23,710*	*503,020*	*170*	*6,150*	*1,470*	*0.7%*	*1.2%*	*0.3%*	*23.9%*
*	**Ita-Suomi**	**16,730**	**320,820**	**150**	**4,420**	**1,270**	**0.9%**	**1.4%**	**0.4%**	**28.7%**
**	*Pohjois-Suomi*	*9,720*	*225,780*	*0*	*0*	*0*	*0.0%*	*0.0%*	*0.0%*	
	SUOMI/FINLAND	91,440	2,171,580	3,450	146,470	35,750	3.8%	6.7%	1.6%	24.4%
	Sydsverige	13,440	557,830	4,110	325,800	52,480	30.6%	58.4%	9.4%	16.1%
	Smaland med oarna	13,490	472,630	680	62,290	7,080	5.0%	13.2%	1.5%	11.4%
	Vastsverige	22,450	685,200	160	13,560	860	0.7%	2.0%	0.1%	6.3%
	Stockholm	2,080	99,390	0	0	0	0.0%	0.0%	0.0%	
	Ostra Mellansverige	14,880	798,670	0	0	0	0.0%	0.0%	0.0%	
**	*Norra Mellansverige*	*10,930*	*264,900*	*0*	*0*	*0*	*0.0%*	*0.0%*	*0.0%*	
**	*Mellersta Norrland*	*6,000*	*110,170*	*0*	*0*	*0*	*0.0%*	*0.0%*	*0.0%*	
**	*Ovre Norrland*	*6,300*	*120,270*	*0*	*0*	*0*	*0.0%*	*0.0%*	*0.0%*	
	SVERIGE	89,570	3,109,060	4,950	401,650	60,420	5.5%	12.9%	1.9%	15.0%
	* region	3,694,980 52.9%	44,962,290 34.9%	64,720 24.1%	5,113,790 30.6%	416,840 19.6%				
	* and ** regions	3,942,850 56.4%	52,010,010 40.4%	94,080 35.1%	6,818,220 40.9%	634,700 29.8%				

* **Priority regions for Structural Funds (Objective 1)**
** *Regions that are partly eligible for Structural Funds (Objective 1)*

Source: Eurostat: Farm structure survey.

Table L.2   Beet growing regions in descending order of average yield and an indication whether they qualify for Structural Funds as Objective 1 region

Member State	Region	Beet yield (1997)	Obj. 1 region (1994-99)	Obj. 1 region (2000-06)
France	Basse-Normandie	77.10 T/ha		
France	Haute-Normandie	76.50 T/ha		
France	Centre	76.10 T/ha		
France	Champagne-Ardenne	75.70 T/ha		
France	Nord-Pas-de-Calais	75.70 T/ha	X^1	
France	Pays-de-la-Loire	75.50 T/ha		
France	Île-de-France	75.20 T/ha		
France	Alsace	72.60 T/ha		
France	Picardie	72.50 T/ha		
Belgium	Région Wallone	68.79 T/ha	X^2	
France	Bourgogne	68.70 T/ha		
Belgium	Vlaams gewest en Brussel	67.64 T/ha		
France	Auvergne	67.40 T/ha		
Greece	Anatoliki Makedonia kai Thraki	64.72 T/ha	X	X
Netherlands	Oost-Nederland	64.54 T/ha	X^3	
Italy	Friuli-Venezia Giulia	64.50 T/ha		
France	Franche-Comté	64.50 T/ha		
Spain	Castilla-León	60.76 T/ha	X	X
Italy	Bolzano-Bozen	60.63 T/ha		
Netherlands	West-Nederland	60.60 T/ha		
Germany	Bayern	60.42 T/ha		
Austria	Westösterreich	60.20 T/ha		
Italy	Veneto	60.09 T/ha		
Greece	Thessalia	59.80 T/ha	X	X
Spain	Pais Vasco	59.24 T/ha		
Austria	Ostösterreich	58.10 T/ha	X^4	X^4
Italy	Campania	57.40 T/ha	X	X
Germany	Nordrhein-Westfalen	57.37 T/ha		
United Kingdom	United Kingdom	56.64 T/ha	X^5	X^6
Italy	Piemonte	56.53 T/ha		
Spain	Castilla-La Mancha	56.44 T/ha	X	X
France	Rhône-Alpes	56.00 T/ha		
Italy	Lombardia	55.67 T/ha		
Spain	Asturias	55.55 T/ha	X	X
Greece	Kentriki Makedonia	55.45 T/ha	X	X
Netherlands	Zuid-Nederland	55.31 T/ha		
Greece	Sterea Ellada	55.26 T/ha	X	X
Spain	La Rioja	54.79 T/ha		
Netherlands	Noord-Nederland	53.47 T/ha		
Germany	Niedersachsen	53.10 T/ha		
France	Lorraine	53.00 T/ha		
Germany	Hessen	52.89 T/ha		
Germany	Baden-Württemberg	52.79 T/ha		
Germany	Rheinland-Pfalz	52.79 T/ha		
Austria	Südösterreich	51.70 T/ha		
Spain	Aragón	51.10 T/ha		
Germany	Schleswig-Holstein	50.86 T/ha		

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Member State	Region	Beet yield (1997)	Obj. 1 region (1994-99)	Obj. 1 region (2000-06)
Denmark	Danmark	48.80 T/ha		
Spain	Andalucía	48.18 T/ha	X	X
Greece	Dytiki Makedonia	48.01 T/ha	X	X
Italy	Umbria	47.27 T/ha		
Italy	Toscana	46.84 T/ha		
Italy	Lazio	45.33 T/ha		
Spain	Extremadura	45.00 T/ha	X	X
Italy	Emilia Romagna	44.80 T/ha		
Sweden	Sydsverige	44.50 T/ha		
Ireland	Ireland	43.58 T/ha	X	X[7]
Portugal	Portugal	42.82 T/ha	X	X[8]
Spain	Navarra	42.33 T/ha		
Italy	Sardegna	42.32 T/ha	X	X
Italy	Molise	42.10 T/ha	X	
Sweden	Småland med öarna	40.62 T/ha		
Sweden	Västsverige	40.62 T/ha		
Italy	Basilicata	39.41 T/ha	X	X
Germany	Sachsen	39.26 T/ha	X	X
Germany	Mecklenburg-Vorpommern	39.16 T/ha	X	X
Finland	Etalä-Suomi	38.82 T/ha		
Italy	Puglia	38.66 T/ha	X	X
Italy	Marche	37.90 T/ha		
Germany	Brandenburg	37.43 T/ha	X	X
Germany	Sachsen-Anhalt	34.68 T/ha	X	X
Germany	Thüringen	34.28 T/ha	X	X
Italy	Abruzzi	31.01 T/ha	X	
Italy	Calabria	29.83 T/ha	X	X

[1]   only Avesnes, Douai, Valenciennes
[2]   only Hainaut
[3]   only Flevoland
[4]   only Burgenland
[5]   only highlands and islands, Merseyside, Northern Ireland
[6]   only South Yorkshire, West Wales & The Valleys, Cornwall & Isles of Scilly, Merseyside
[7]   only Border Midlands and West
[8]   all regions, except Lisboa e Vale do Tejo
Source: Beet yields from Eurostat, priority regions from Vanhove (1999).

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Table L.3 Sugar beet growing regions in order of increasing percentage of growth of sugar production between 1990 and 1997

	Beet growing regions (Priority Regions in bold)	Beet yield per ha 1997 (1990)	Area Sugar Beet 1997 ha	Area Sugar Beet 1990 Ha	Sugar beet area – change 1990-97	Sugar production 1997 tonne	Sugar production 1990 tonne	Sugar production – change 1990-97
*	**Ipeiros**	(57.2)	0	20	-100.00%	0	212	-100.00%
*	**Nisia Ionia**	/	0	30	-100.00%	0	346	-100.00%
*	**Dytiki Ellada**	/	0	110	-100.00%	0	1,268	-100.00%
*	**Peloponnisos**	/	0	40	-100.00%	0	461	-100.00%
*	**Voreio Aigaio**	/	0	10	-100.00%	0	115	-100.00%
*	**Notio Aigaio**	/	0	10	-100.00%	0	115	-100.00%
*	**Kriti**	/	0	20	-100.00%	0	230	-100.00%
*	**Galicia**	/	0	10	-100.00%	0	63	-100.00%
	Madrid	(41.0)	0	70	-100.00%	0	411	-100.00%
*	**Comunidad Valenciana**	/	0	10	-100.00%	0	63	-100.00%
*	**Murcia**	(30.0)	0	20	-100.00%	0	86	-100.00%
*	**Canarias**	/	0	10	-100.00%	0	63	-100.00%
	Bretagne	(45.9)	0	60	-100.00%	0	343	-100.00%
*	**Sicilia**	(42.9)	0	20	-100.00%	0	129	-100.00%
*	**Lisboa e Vale do Tejo°**	/	0	30	-100.00%	0	115	-100.00%
	Aragón	51.1	10	370	-97.30%	65	2,131	-96.95%
*	**Basilicata**	39.4	980	3,800	-74.21%	4,229	20,830	-79.70%
*	**Extremadura**	45.0	1,850	4,140	-55.31%	10,576	21,001	-49.64%
	Südösterreich	51.7	180	300	-40.00%	1,568	2,652	-40.89%
	Emilia Romagna	44.8	73,710	95,280	-22.64%	361,526	593,640	-39.10%
*	**Anatoliki Makedonia kai Thraki**	64.7	17,660	13,790	28.06%	113,540	171,059	-33.63%
*	**Kentriki Makedonia**	55.4	15,950	12,140	31.38%	87,853	129,014	-31.90%
*	**Abruzzi***	31.0	5,130	5,760	-10.94%	17,419	24,845	-29.89%
*	**Calabria**	29.8	2,920	3,190	-8.46%	9,536	13,234	-27.94%
*	**Sterea Ellada**	55.3	1,540	1,070	43.93%	8,453	11,331	-25.40%
*	**Thessalia**	59.8	6,660	4,620	44.16%	39,559	52,947	-25.28%
*	**Dytiki Makedonia**	48.0	2,510	1,730	45.09%	11,971	15,919	-24.80%
*	**Campania**	57.4	1,120	1,160	-3.45%	7,038	9,260	-23.99%
	Rhône-Alpes	56.0	310	370	-16.22%	2,179	2,842	-23.32%
	Noord-Nederland	53.5	34,320	40,690	-15.65%	287,479	338,128	-14.98%
	Lorraine	53.0	380	450	-15.56%	2,528	2,816	-10.25%
	West-Nederland	60.6	32,040	34,870	-8.12%	304,193	328,430	-7.38%
**	*Oost-Nederland°*	64.5	21,660	23,220	-6.72%	219,031	232,939	-5.97%
	Zuid-Nederland	55.3	26,050	27,860	-6.50%	225,742	239,508	-5.75%
	Veneto	60.1	43,900	36,430	20.51%	288,814	304,454	-5.14%
	Lazio	45.3	7,210	5,930	21.59%	35,788	37,391	-4.29%
*	**Sardegna**	42.3	4,580	3,670	24.80%	21,222	21,602	-1.76%
	Marche	37.9	48,040	38,210	25.73%	199,373	201,441	-1.03%
**	*Région Wallone*	68.8	60,550	68,540	-11.66%	614,295	615,391	-0.18%
	Vlaams gewest en Brussel	67.6	35,230	38,610	-8.75%	340,268	340,875	-0.18%
	Friuli-Venezia Giulia	64.5	5,750	4,520	27.21%	40,608	40,550	0.14%
	Franche-Comté	64.5	1,280	1,190	7.56%	10,362	10,282	0.79%
	Pays-de-la-Loire	75.5	470	760	-38.16%	4,454	4,349	2.41%
	Toscana	46.8	10,490	8,060	30.15%	53,800	52,511	2.45%
*	**Ireland***	43.6	31,710	33,300	-4.77%	222,000	215,000	3.26%
	Danmark	48.8	69,490	66,700	4.18%	504,000	487,000	3.49%
	Auvergne	67.4	4,530	3,960	14.39%	38,322	36,930	3.77%
	Champagne-Ardenne	75.7	99,760	99,680	0.08%	947,856	905,978	4.62%
*	**Puglia**	38.7	17,820	13,400	32.99%	75,426	72,049	4.69%
	Haute-Normandie	76.5	29,330	30,550	-3.99%	281,620	268,143	5.03%
	Centre	76.1	30,400	32,300	-5.88%	290,368	274,643	5.73%
	Sydsverige	44.5	52,480	41,200	27.38%	349,687	326,965	6.95%

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	Beet growing regions (Priority Regions in bold)	Beet yield per ha 1997 (1990)	Area Sugar Beet 1997 ha	Area Sugar Beet 1990 Ha	Sugar beet area – change 1990-97	Sugar production 1997 tonne	Sugar production 1990 tonne	Sugar production – change 1990-97
	Picardie	72.5	170,000	174,390	-2.52%	1,546,953	1,441,509	7.31%
**	*Nord-Pas-de-Calais*	75.7	66,610	71,020	-6.21%	632,886	583,510	8.46%
	Lombardia	55.7	33,370	23,840	39.97%	203,407	184,597	10.19%
	North West	56.6	680	730	-6.85%	5,128	4,603	11.41%
	Westösterreich	60.2	6,930	6,900	0.43%	70,286	62,750	12.01%
	Bourgogne	68.7	8,980	8,700	3.22%	77,432	68,552	12.95%
*	**Andalucía**	48.2	59,000	58,630	0.63%	361,117	318,413	13.41%
	East Anglia	56.6	103,700	108,990	-4.85%	782,012	687,222	13.79%
**	*Yorkshire and Humberside°*	56.6	24,590	25,770	-4.58%	185,436	162,489	14.12%
	South East	56.6	5,120	5,240	-2.29%	38,610	33,040	16.86%
**	*Ostösterreich*	58.1	42,880	42,500	0.89%	419,731	356,333	17.79%
	East Midlands	56.6	44,170	44,000	0.39%	333,090	277,436	20.06%
	Umbria	47.3	6,120	3,950	54.94%	31,676	25,971	21.97%
	La Rioja	54.8	3,560	3,250	9.54%	24,779	20,072	23.45%
*	**Castilla-León**	60.8	86,210	76,790	12.27%	665,491	525,974	26.53%
	Basse-Normandie	77.1	9,800	10,470	-6.40%	94,835	74,797	26.79%
	West Midlands	56.6	16,590	15,360	8.01%	125,107	96,850	29.18%
*	**Molise***	42.1	7,320	4,440	64.86%	33,745	26,001	29.78%
	Alsace	72.6	6,040	5,160	17.05%	55,038	41,945	31.22%
	Île-de-France	75.2	48,420	48,850	-0.88%	457,017	340,454	34.24%
	Schleswig-Holstein	50.9	15,230	16,670	-8.64%	126,793	91,868	38.02%
	Niedersachsen	53.1	129,980	141,550	-8.17%	1,129,726	814,405	38.72%
	South West	56.6	910	780	16.67%	6,862	4,918	39.53%
	Hessen	52.9	20,430	21,920	-6.80%	176,888	125,633	40.80%
	Baden-Württemberg	52.8	22,040	23,550	-6.41%	190,461	134,716	41.38%
	Nordrhein-Westfalen	57.4	76,110	79,590	-4.37%	714,738	494,764	44.46%
	Pais Vasco	59.2	3,770	2,930	28.67%	28,372	19,565	45.01%
	Bayern	60.4	77,630	80,650	-3.74%	767,789	528,021	45.41%
	Luxembourg	50.0	10	10	0.00%	73	50	45.86%
	Rheinland-Pfalz	52.8	23,030	22,660	1.63%	199,016	129,625	53.53%
**	*Wales*	56.6	100	60	66.67%	754	378	99.33%
	Piemonte	56.5	16,700	6,220	168.49%	103,370	48,908	111.36%
	Navarra	42.3	110	50	120.00%	592	239	147.94%
*	**Castilla-La Mancha**	56.4	14,880	6,250	138.08%	106,695	39,764	168.32%
*	**Açores**	42.8	240	220	9.09%	11,000	846	1199.85%
	Bolzano-Bozen	60.6	10	0	++	66	0	++
*	**Asturias**	#N/A	50	0	++	353	0	++
	Västsverige	37.7	860	NA		5,664	NA	
	Småland med öarna	37.7	7,080	NA		46,630	NA	
	Etalä-Suomi	38.8	33,010	NA		125,577	NA	
*	**Itä-Suomi**	38.8	1,270	NA		4,831	NA	
**	*Väli-Suomi*	38.8	1,470	NA		5,592	NA	
*	**Brandenburg**	37.4	12,560	NA		76,960	NA	
*	**Thüringen**	34.3	13,150	NA		73,787	NA	
*	**Sachsen**	39.3	18,480	NA		118,772	NA	
*	**Mecklenburg-Vorpommern**	39.2	33,760	NA		216,416	NA	
*	**Sachsen-Anhalt**	34.7	59,490	NA		337,773	NA	

Notes:
▲ Sugar production is equal to sugar beet area of a region multiplied by the average beet yield per ha and the average sugar extraction rate.
▲ Beet yields for the UK are national, not regional data.
▲ For Belgium, Germany, Greece, Spain, Italy and the Netherlands, regional beet yields were not available for 1997. The figures in the table are estimates based on the regional yields in 1990, and the evolution of the national yields between 1990 and 1997.
Source: Eurostat: Eurofarm Survey.

Table L.3 shows that the beet area has increased slightly by 0.25% and sugar production by 11% between 1990 and 1997 (in those regions for which data were available for both years). In the Priority Regions beet area grew by 12%, while sugar production rose by 7%. These regions now account for 20% of the beet area in the EC. That percentage was only 12.8% in 1990. The increase can be explained by the inclusion of Eastern Germany in the EC. Without the East German regions, the Priority Regions would account for 13,1% in 1997, which is not so different from the situation in 1990. The accession of Finland and Sweden did not alter the situation much: in Sweden most beets are grown in Sydsverige, (and smaller quantities in Smaland med oarna and Vastsverige), regions which are not eligible under objective 1. In Finland, 92% of the beet area is situated in Etela-Suomi-Uusimaa, a region that is not a priority region either.

The correlation coefficient between beet yields per ha and evolution of beet area was slightly positive: 0,11, but statistically not significant ($p=0.36 \gg 0.05$). Beet yields per hectare are thus not the major explanatory factor for the evolution of beet area. The beet area has not decreased or increased at a statistically significant different rate in the high yield regions than in other regions.

Annex M List of persons interviewed/consulted

The Netherlands
- Mr. F.J. van Maurik, Policy Coordinator Vegetable Products, Ministry of Agriculture, the Netherlands.
- Mr. H.E. Clevering, Chairman of COSUN (cooperative sugar factories); Chairman of the Dutch Sugar Monitoring Committee and member of the Comité Consultatif Groupe Permanente.
- Mr. G.F. Brijder, Secretary Dutch Sugar Monitoring Committee and Dutch Member of the EC Sugar Management Committee.
- Mr. W.H. Dijkstra, Secretary of the Board of COSUN (cooperative sugar factories).
- Mr. A.C. Verbeek, RABO Bank International.

France
- Mr. Jeanroy, Director Confédération Générale des Planteurs de Betteraves.
- Mr. Gwénael Elies, Confédération Générale des Planteurs de Betteraves, Services d'études Economiques et Financières.
- Mr. Bruno Bourges, Director Syndicat National des Fabricants de Sucre de France.
- Mr. Lionel Leonard, Syndicat National des Fabricants de Sucre de France.
- Mr.. Alain Brindel, Deputy Director Fonds d'Intervention et de Régularisation du Marché du Sucre.
- Mr. Francis Foure, Fonds d'Intervention et de Régularisation du Marché du Sucre, France.

Belgium
- Mr. J. Beauduin, Director General CEFS (Comité Européen des Fabricants de Sucre).
- Mr. M. Rosiers, Director General Subel (Société Générale des Fabricants de Sucre de Belgique).
- Mr. H. Chavanes, Chairman Confédération Internationale des Betteraviers Européennes (CIBE).

CIUS (Committee of Industrial Sugar Users);
- Mrs. J. Steward, President of CIUS and representative of Mars.
- Mr. A. Malik, Director Commercial Affairs Coca Cola.
- Mr. H. Werner, Director Werner's Fine Dragees.
- Mrs. H. O'Sullivan, CIUS.

CEC
- Members of the Steering Group.
- Mr. J.L. Fernandez Martin, Head Sugar Unit, DG Agriculture.
- Mr. R. Eddy, Sugar Unit, DG Agriculture.
- Mr. A. De Angelis, FADN, DG Agriculture.
- Mr. B. Buffaria, DG Agriculture.
- Mr. L.Van der Catseye, DG Budget.

- ▲ Mr. M. Pecci-Boriani, DG Budget.
- ▲ Mr. Y. Dussart, DG Consumer Affairs.

ACP London Sugar Group

- ▲ J.-C. Tyack, Chairman ACP London Sugar Group, General Overseas Representative, Mauritius Chamber of Agriculture.
- ▲ Hon. Mr. I. Mataitonga, Ambassador Fiji Islands.
- ▲ John Collecott, Secretary, ACP London Sugar Group representing Zimbabwe, Director Czarnikow Sugar.
- ▲ Mr. G. Govinden, Representative Mauritius Chamber of Agriculture.
- ▲ Mr. N. Singh, Fiji Embassy Brussels, Counsellor Agriculture and Trade.
- ▲ Mr. J. Price, ACP London Sugar Group, representing Malawi/Tanzania, ED&F MAN.

Various

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- ▲ Mrs. T. Daly, Ministry of Agriculture, Fisheries and Food (MAFF), London, U.K. Economic Adviser.
- ▲ Mr. B. Borrell, Bureau of International Economics, Australia.
- ▲ Mr. S. Crampton, Secretary Consumers in Europe Group, London, U.K.
- ▲ Mr. P. Dymock, OECD, Group on Cereals, Animal Feeds and Sugar.
- ▲ Mr. U. Sommer, Federal Agricultural Research Centre (FAL), Braunschweig, Germany
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