CO-EXTRA

GM and non-GM supply chains: their CO-EXistence and TRAceability

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Description of cost structure of representative food and feed supply chains

Participants;

FOI, FiBL, INRA, HOGENT, CREDA, FW, SGGW/WAU, TECPAR, INTA

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1. Introduction

This deliverable is related to WP3 task 3.1 – "Description of value chain structure in existing food commodity systems".

The deliverable is a working document for the partners in WP 2 and WP3.

The purpose of the document is to give a description of the present cost structure in selected representative food and feed supply chains (see table 1 below).

The work on cost structures has been carried out in cooperation between WP2 and WP3 and the descriptions take a starting point in the technical descriptions of the supply chains as reported in D.2.2, in which also a first identification of the Critical Points are reported.

The data for the cost structure description was originally planned to be based on statistics and public available company reports and balance sheets together with interviews based on a common interview guide between WP2 and WP3.

The interview guide was not finalized until June 2006, and therefore it was decided to base the first description of the cost structure on national statistics, public available, company reports and balance sheets.

The present descriptions of the cost structures are not complete and the specification level varies both between supply chains and regions depending on the available data. Therefore the summary descriptions of cost structure in this report should be considered as a first step of information collection which will be completed during the interviews which are presently performed by the individual partners based on the common interview guide for use in task 3.2 and 3.4.

Some countries like Brazil have already access to information regarding the total cost of separating the commodities. This is due to the long history of growing GMO crops in the country. For the majority of member states in the EU information regarding coexistence is limited and only with regard to imported commodities

1.1. Overview of crops investigated

In table 1 the crops and supply chains that are under investigation are presented together with the countries in which the individual crops are analyzed.

Crop	Soybean	Maize	Rape seed	Wheat	Sugar beet
Argentina	X				
Belgium	X				
Brazil	X				
Denmark	X	X		X	X
France	X		X		
Germany				X	X
Poland	X		X		
Spain		X			
Switzerland		X	X		
England					X

Table 1. List of analyzed supply chains and countries.

1.2. The original proposed cost structure

In order to obtain useful data for the work on the cost structure, the following procedure was proposed; the procedure is split into two sections consisting of an actual cost structure followed by a description of the cost types. Knowing that difficulties in obtaining detailed information regarding costs could pose a problem the suggested procedure was intended to procure data that could be estimated using national statistics, public available company reports and balance sheets.

1.2.1. Step1. Cost structure

To analyze the cost structure for the various production chains it was suggested that a preliminary assessment of the value added in the production chain could be obtained by comparing input and output prices in each element of the chain.

For each element in the supply chain it would be necessary, if possible, to provide the output price and the input price for the main products. The difference between price of the main product and price of the main input would then give an indication of production costs and profits (value added) in each link of the value chain.

Production costs and profits = Output Price of main output – Input Price of main input

However, many production processes involve by-products as well as the main product. For those processes it would be necessary to deduct any value of these goods in the overall sales revenue. In most cases, it can be assumed that saleable by-products are “profit neutral” in the sense that sales prices of the by-products equals their costs through the system. However there are examples where the sales of byproducts are necessary to gain an overall profit.

Moreover, any price/production subsidies or levies should be specified if relevant.

The practical way forward was to try to collect the input and output prices for each element in the production chain for conventional non-GM production. These prices were expected to be available from national and regional statistics for the various crops and products.

1.2.2. Step 2 – cost types

The next step was to assess the various cost types in each element in the supply chain. A division into cost types gives an indication of the flexibility in the individual elements the chain. A high share of fixed costs (i.e. capital costs) may imply a low flexibility in the production chain whereas a high share of variable costs (i.e. raw materials costs) could imply higher flexibility.

For simplicity reasons it was suggested that each cost type is given as a percentage of the total costs - and divided into the following cost types:

- Raw materials
- Other variable costs
- Labor
- Capital costs
- Other
- Value of by-products

It was acknowledged from the beginning that it could be difficult at this stage of the project to identify these categories in detail. In order to provide these exact data it will be necessary to conduct in depth interviews with the relevant stakeholders. However, in order to give a preliminary overview of the cost structure it was suggested that initial estimates of the above mentioned types would be helpful in the further work to be done. The final estimates will be reported in connection with the basic cost calculations of the selected chains (D 3.7.).

2. Current cost structure

In this section a summary description of the main data that has been gathered so far is presented. The summaries are based on the individual partners' reports. As stated in the introduction there is a great difference in the amount of data the participants have been able to find. This is due to the fact that many interviews have not been conducted yet. Also there is a great difference in the way participants have been able to report the different types of cost that were suggested. This is mainly due to various traditions in financial reporting in the various countries. When all interviews are conducted a better foundation for comparison will be provided.

2.1. Summary of maize chain (Denmark, Spain and Switzerland)

2.1.1. Introduction

Initial estimates regarding the price of grain maize and the value added in the various steps in the chain is presented. Detailed information awaits interviews. Very few data have currently been obtained regarding the in-house production/processing costs as these are not in any way publicly available. In the case of Switzerland estimates for the cost of processing in percentage of final price has been presented. The highest share of the cost is the raw material followed in decreasing order by grinding, mixing, receiving + cleaning, and finally storing. The price for the raw material when imported is highly correlated with the country of origin. The exact reason for this awaits interviews. With regard to maize, interviews are yet to be conducted for Denmark and Switzerland and Spain is experiencing difficulties in getting interviews with the industry.

2.1.2. Production and supply balance

Production of maize is presented in figure 1 below. As can be seen the production in Spain has been fairly constant over the years with Spain by far being the biggest producer. In Denmark maize is only grown for feed (silage) but this has been increasing dramatically over the last decade. New varieties of maize can be grown in Denmark and is replacing the fodder beet. Maize is easier and cheaper to handle which is the main reason for the observed increase.

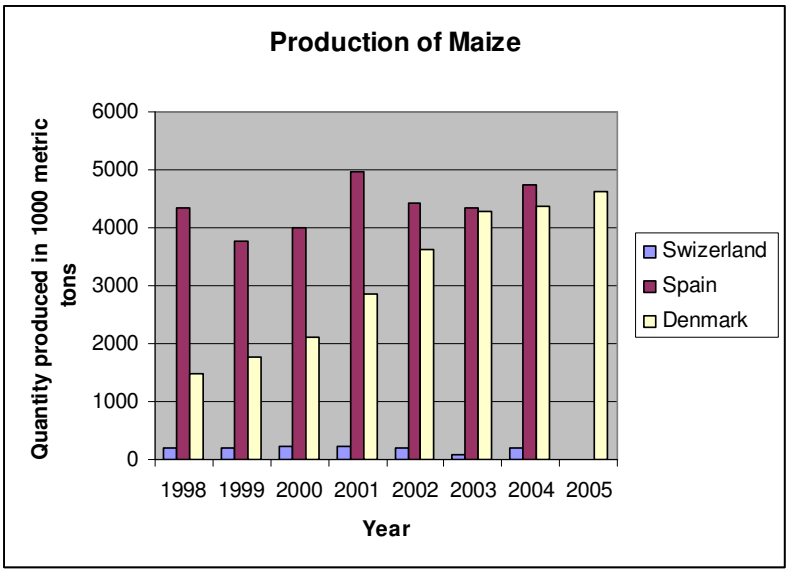

Figure 1: Production of maize in Switzerland, Denmark and Spain.

In figure 2 the supply balance for maize is presented for the countries. Data are presenting average figures from 1998-2005.

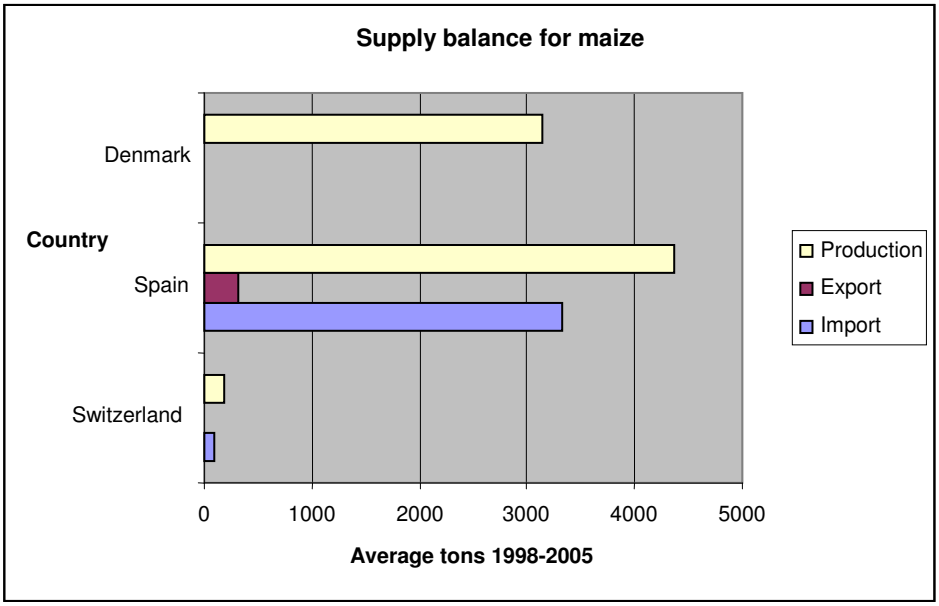

Figure 2: supply balance for maize in Switzerland, Spain and Denmark

From the figure it is evident that Spain is the biggest producer of maize. This is also the only country that is currently producing GM maize. Denmark and Switzerland have no GM production and imports for both countries are very limited. In 2004 the amount of GM maize imported to Switzerland was 23.3 tons at a value of 169 € / ton.

2.1.3. Prices

In figure 3 the current producer prices for maize is presented. It can be seen that the price of maize is highest in Switzerland which is partly due to a larger organic share of the production. In the case

of Denmark no market price exists for domestic grown maize as it is utilized on own farms for silage and not sold in a market.

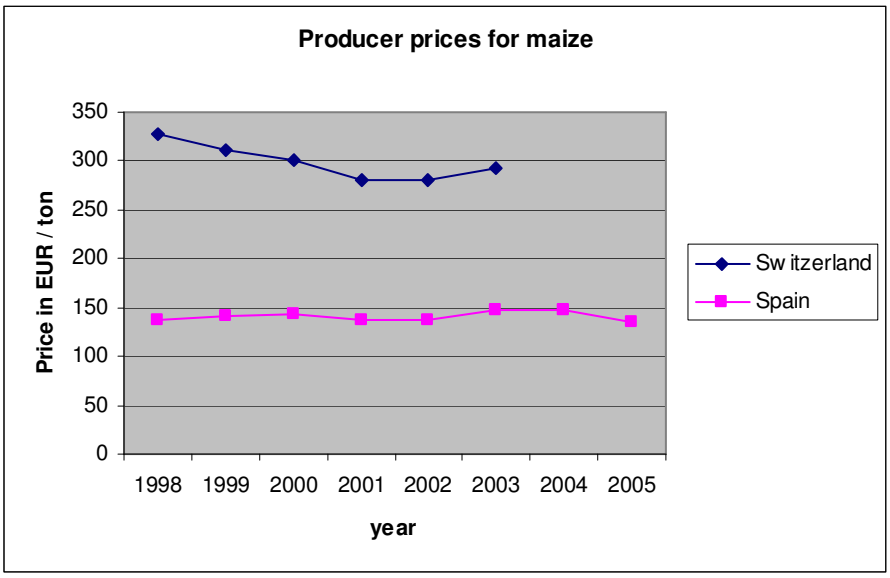

Figure 3: Producer price for maize in Switzerland and Spain. Source FAO 2006 (Switzerland) and Eurostat (Spain)

2.1.4. Cost structure supply chain

In table 1 some data regarding the cost structure for the maize supply chain in Switzerland and Spain are presented.

	Producer price	Elevator price	Import price	Export price	Basic Fodder
Switzerland	300	-	320	n.a.	383
Spain	141	142	120	179	163

Table 1 Overview of currently available data regarding cost structure in supply chain

Detailed information data regarding costs for GM and non-GM maize have not been precisely obtained yet. They await interviews with industrial stakeholders whom in the case of Spain are not keen to give information. Switzerland has data on imports that are highly depended on country of origin. Organically grown maize may cause the higher prices from some countries.

In general prices for maize in Switzerland seem higher than in Spain. A possible explanation is the use of GM maize in Spain which reduces production price and hence prices in general. Switzerland is not an EU member with a different structure regarding subsidies etc. This will also influence prices.

2.1.5. Cost structure

In figure 4 below the current known cost structure for handling maize for Switzerland is presented. The most important cost factor is the price of the raw material. The sum of the costs comes to 383 € for Switzerland which is the price for maize as a single compound feed as stated in table 1 above.

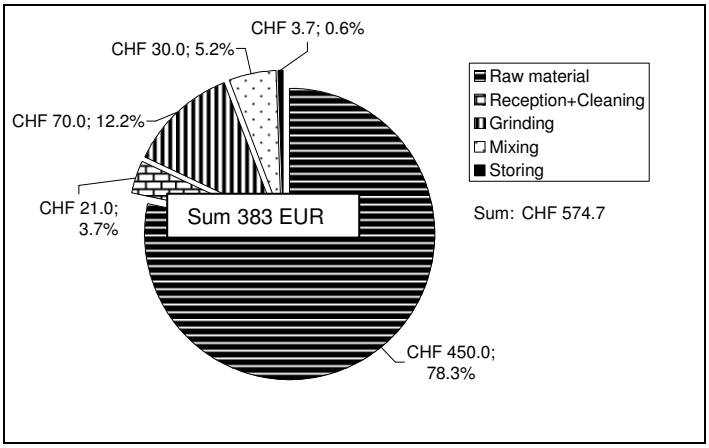

Figure 4:
Minimum processing prices for grain maize. For storing a period of three months is estimated. (Switzerland)

In table 2 cost related to handling maize is summarized as far as currently possible.

Table 2: Costs for different processing steps in the feed mill (Switzerland)

Producer price	
	282 € / ton
Reception and cleaning	
	13 € / ton
Grinding and Mixing	
Grinding	44-66 €/ ton
Mixing	19-25 EUR/ ton
Crushing / flaking	50-78 €/ ton
Pressing/dicing	13-25 €/ ton
Storing	
Storing for 1 year	7 €/ ton
Removal/transfer in bulk	Free
Removal/transfer in sacks	28 €/ ton

2.2. Summary of rape seed (France, Poland and Switzerland)

2.2.1. Introduction

In the case of rapeseed data have been presented for producer prices as well as input and output prices in the chain. It has been stated that the price for rape seed oil is very depending on the price fluctuations on the market for fuel. From France data has been presented indicating a profit for the elevators at about 10-20% value added compared to their buying price.

From Germany the value added from the farm gate to the sale at the elevator is roughly 8% for food products and 16% for non-food products. Also it is demonstrated that the main cost driver in the processing industry is the cost of raw material in the German case accounting for about 86% on sales.

Calculations show that the average value added in the rapeseed oil crushing process is 17% in France, 20% in Switzerland and 27% in Poland.

Also in the case of rapeseed it has been difficult to come up with exact prices that are strictly related to rapeseed. More detailed information awaits interviews.

2.2.2. Production and supply balance

In the figure 1 below the production of rapeseed for France, Poland and Switzerland is presented.

Figure 1: The production of rape seed in France, Poland and Switzerland.

From the figure it can be seen that France is the biggest producer with a production more than twice the size of Poland. In relation to France and Poland the production in Switzerland is very small.

In figure 2 a simplified supply balance for the countries is presented as the average of the years 1998-2004. In the case of Poland some fairly large fluctuations in the export and import data exist.

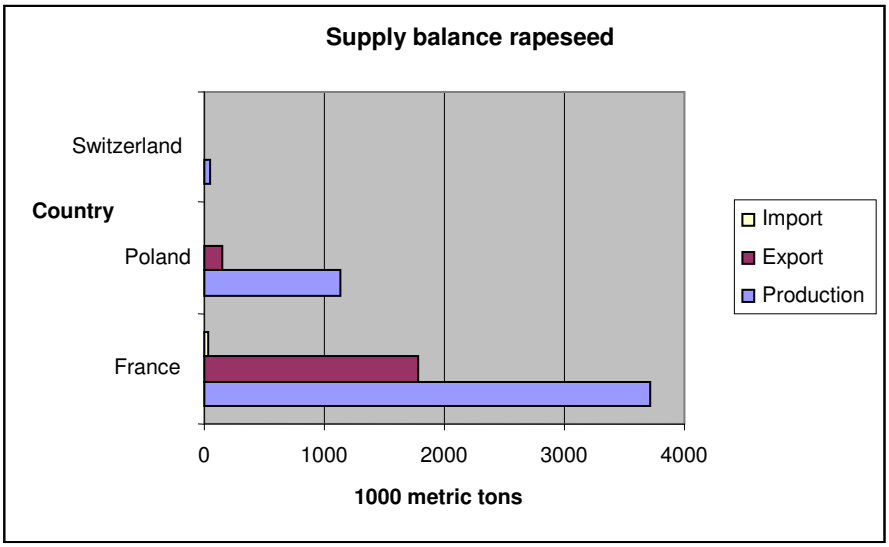

Figure 2: Supply balance for rapeseed in Switzerland, Poland and France. Average numbers from 1998-2004. Source FAO.

2.2.3. Prices

In figure 3 the producer prices based on Eurostat is illustrated.

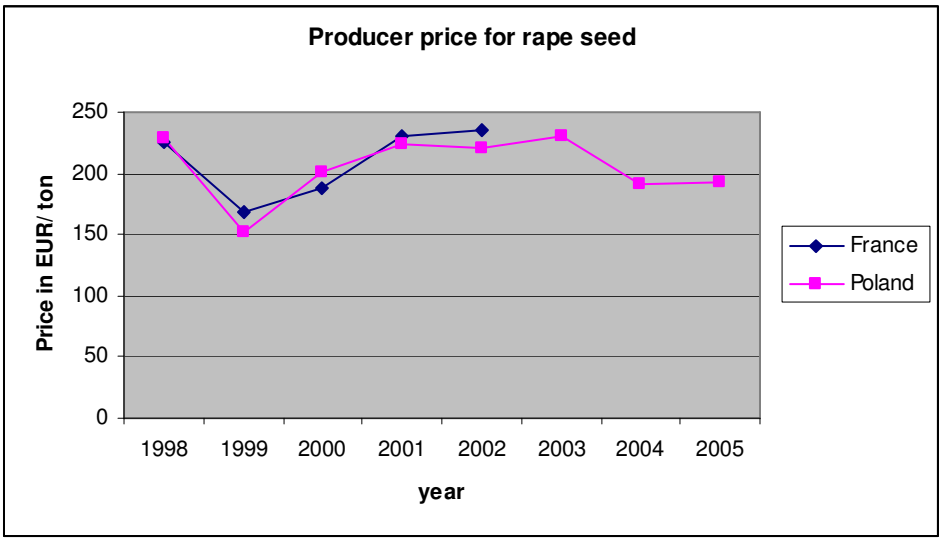

Figure 3: Producer price for rapeseed in Poland and France. Source Eurostat 2006.

The prices in France and Poland are similar over time. In the year 1999 producer prices on rape falls substantially due to the changes in the CAP. The prices observed for rape meal and rape oil in 2005-2006 (see table 1) appears to be slightly lower in France compared to Poland. A possible explanation for this observation is higher handling costs in Poland. The prices for all products derived from rapeseed in Switzerland are much higher. The fact that Switzerland is not an EU member and therefore not operating under the EU agricultural schemes is surely part of the explanation. In table 1, an overview of rapeseed product prices in the countries are presented.

	Poland € / ton	France € / ton	Switzerland € / ton
Rape seed price	~ 246 (2005-2006)	160-320 (1999-2005)	527-548 (2004)
Rape meal price	~ 105 (2005-2006)	~ 101 (2005-2006)	196 (2004)
Rape oil domestic price	~ 658 (2005-2006)	~ 622 (2005-2006)	1670 (2004)

Table 1: Comparison of rapeseed product prices between Poland, France and Switzerland.

Further information awaits interviews.

2.2.4. Cost structure

In the case of France the value added from input to output in the elevator has been between 10-20 % percent from 1998 till 2001 (see table 2)

	98-99	99-00	00-01
Input Price (€/T)	204,97	159,82	180,59
Ouput Price (€/T)	230,55	188,34	212,23
Profits	25,57	28,53	31,64

Table 2. Prices of rapeseed for the period 1998-2001 at the elevator level.

In figure 4 an overview of the data concerning value added in the elevators is presented.

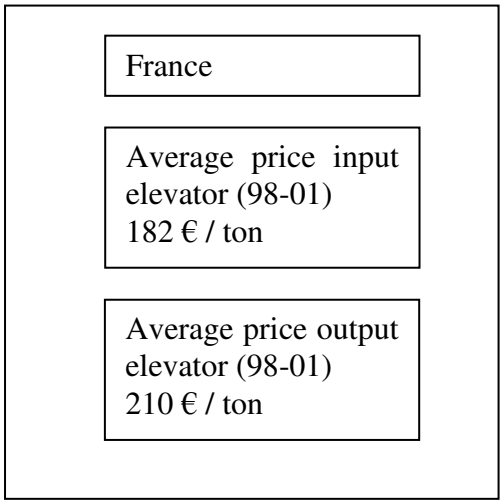

Figure 4: value added in the elevator

In figure 5 the cost structure for the production of rapeseed oil rapeseed meal is estimated.

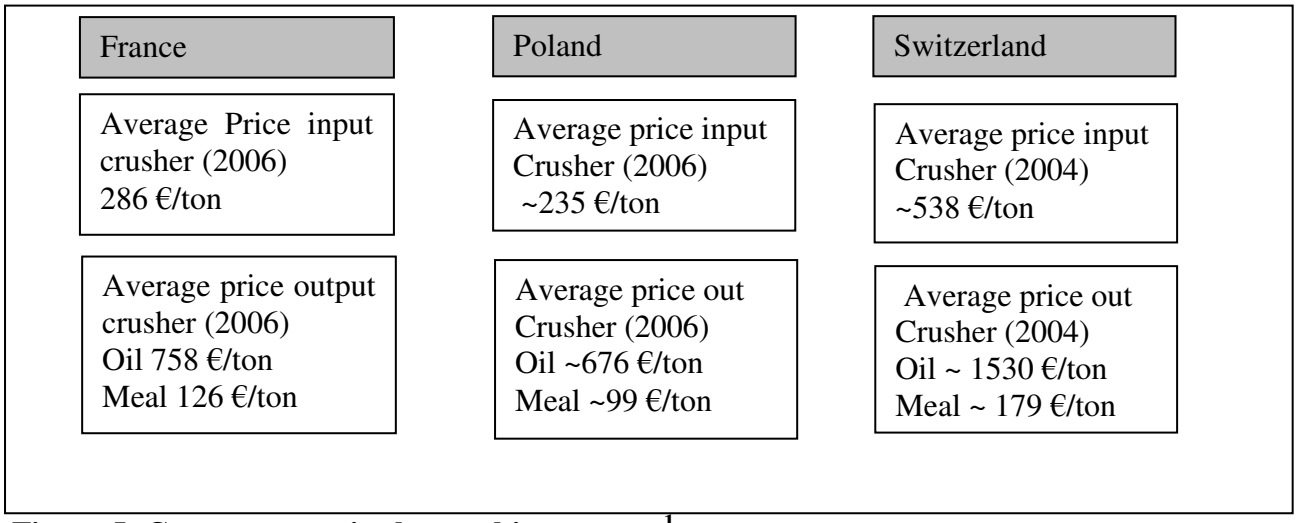

Figure 5: Cost structure in the crushing process[1].

From the figure it can be seen that the rapeseed oil is the most valuable product and that the added value is quite large.

Added Value
In table 3 the added value for rape seed crushing plants is presented.

France (2006)	~17%
Poland (2006)	~27%
Switzerland (2004)	~20%

Table 3: Value added in crushing plant.

Processing industry
In table 4 an overview of the oil seed processing industry in France is presented.

Oleaginous industry (up to 2004)	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Number of companies	27	26	26	24	25	27	28
Average number of employees	4320	4123	3300	3310	3241	2104	1971
Sales turnover net of tax (M€)	2455	2235	2399	3137	3483	1739	1750
Exportation sales turnover (M€)	366	335	325	423	491	273	296
Added value to the market price (M€)	384	382	375	318	409	243	235
Bottom line before taxes (M€)	82	73	115	108	136	63	64
Investments (M€)	70	50	37	42	39	33	36

Table 4. Financial overview of the vegetable oil supply chain in France (Source: ONIOL)

The number of companies has been almost constant during the last 6 years but the number of employees has sharply decreased. In the mean time the export sales turnover has decreased by more that 20% and the added value to the market price has decreased by 40% between 1998 and 2004. This situation may be different today due to the recent Energy policies. It appears that the

[1] Danske Bank, exchange rates; 1€ = 1.67 Switzerland Francs, 1€ = 3,62 Poland Zloty (October, 2007)

investments have also decreased by 50%, in that case it could probably be partly explained by the traceability and segregation investments that were done at the end of the 90's due to the sanitary issues in the food industry in France.
In Poland there are 8 main crushing plants that process ca. 95% of the total rapeseed oil. Three the biggest are: Kruszwica SA, ADM SA and ELSTAR OILS SA. A short presentation is given below.

- *ZT "Kruszwica" S.A* The company is the largest Polish buyer of rapeseed, every year it buys approximately 25% of the oil seed produced in the country. ZT "Kruszwica" is the unquestionable leader in the bottled oils market and the owner of the strongest brands in this segment. The volume share of the brands of ZT "Kruszwica" S.A. in the market stands at 32%, which correspond to over 90,000 tons of oil. The company is also one of the leading producers of margarines and confectionery fats with the volume of production over 51,000 tons.
- *Wielkopolskie Zakłady Tłuszczowe ADM Szamotuły* – a subsidiary of the ADM Company, a foreign investor. This is another big buyer of rapeseed on the Polish market with crushes plant capacity at the level of 420,000 tons. The company is only producing crude rapeseed oil which is sold to food companies, industrial users or on other companies' brands. From two years the company is also the supplier of the oil for the biodiesel industry (mainly in Germany).
- *Elstar Oils S.A* Last season Elstar Oils purchased about 110,000 tons of rapeseed and plans to increase its capacity to 150,000 tons next season. The market share in refined oils stands at 5% and in fat production at 15%, which correspond to over 23,000 tons of oils and 12,000 tons of fats.

2.3. Summary of wheat chain (Denmark and Germany)

2.3.1. Introduction

At present data have been presented concerning the prices at farm gate and at elevator for wheat to be used for feed as well as for food. The main cost for producing is the cost of raw material with a share of 86% of final sales.

In Germany other main costs are identified with wages and salaries holding a proportion of 8.5% on sales. Costs of depreciation, amortization and other operating expenses are quite low.

The German case also presents a current cost structure on starch factories. Further information awaits interviews.

2.3.2. Production and supply balance

Production of wheat is presented in figure 1 below. The production of wheat in both Denmark and Germany has been quite stable over the last 6 years. In Germany around 20% of the wheat is utilized on own farms and 80% are sold in the marked. In Denmark, 80% is utilized as animal feed and 20% are sold in the market primarily for production of bread. In 2004 Germany exported 0.14 million tons of wheat to Denmark.

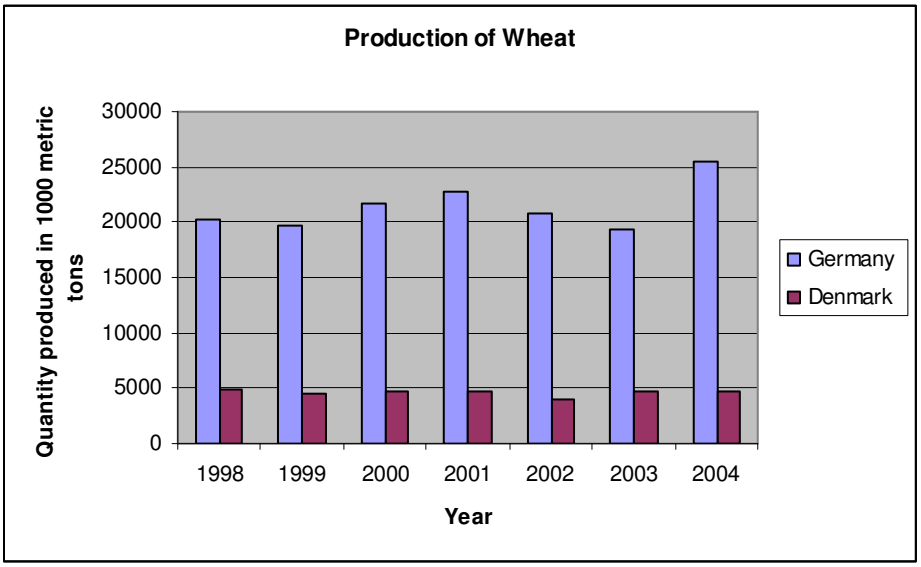

Figure 1: Production of wheat. Source FAO 2006

In figure 2 a simplified mass balance is shown for Danish and German production of wheat.
The proportions of production, import and export are similar.

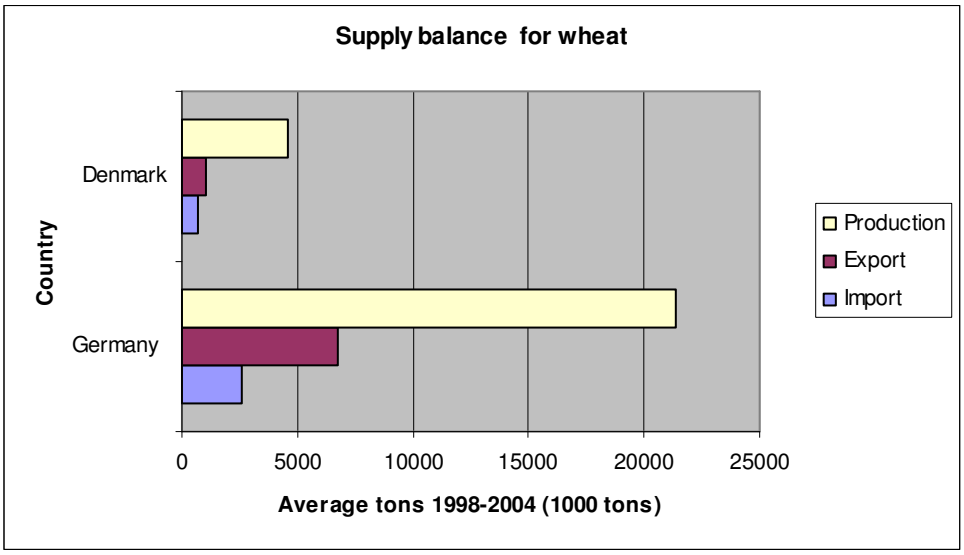

Figure 2: supply balance for wheat in Denmark and Germany. Based on a 6 years average from 1998-2004.

2.3.3. Prices

In figure 4 the prices on soft wheat is shown. It can be seen that the prices in Germany and Denmark are almost identical with only small variations over that last years. As from July 2006 the price of wheat has however increased substantially. The prices are not yet updated on Eurostat for 2006 and 2007, but in Denmark the price in July 2007 was slightly above 170 €/ton.

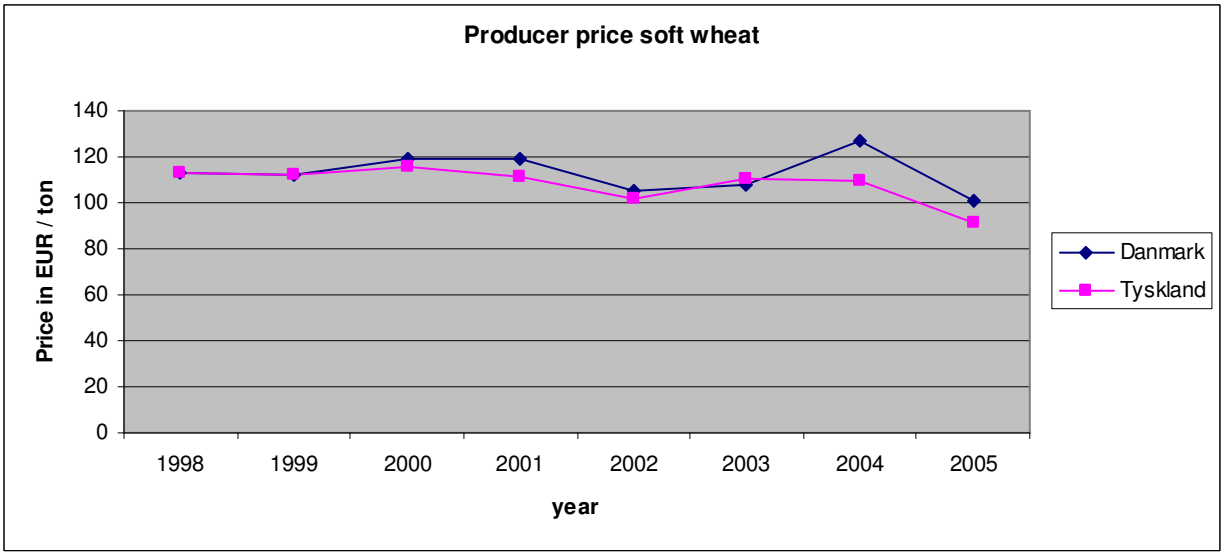

Figure 4: Prices on soft wheat. Data based on Eurostat 2006

2.3.4. Cost Structure

In figure 5, a simple overview of added value is presented. The data presented from Germany represents wheat for starch production whereas the Danish example is wheat to be used as feed primarily for pigs.

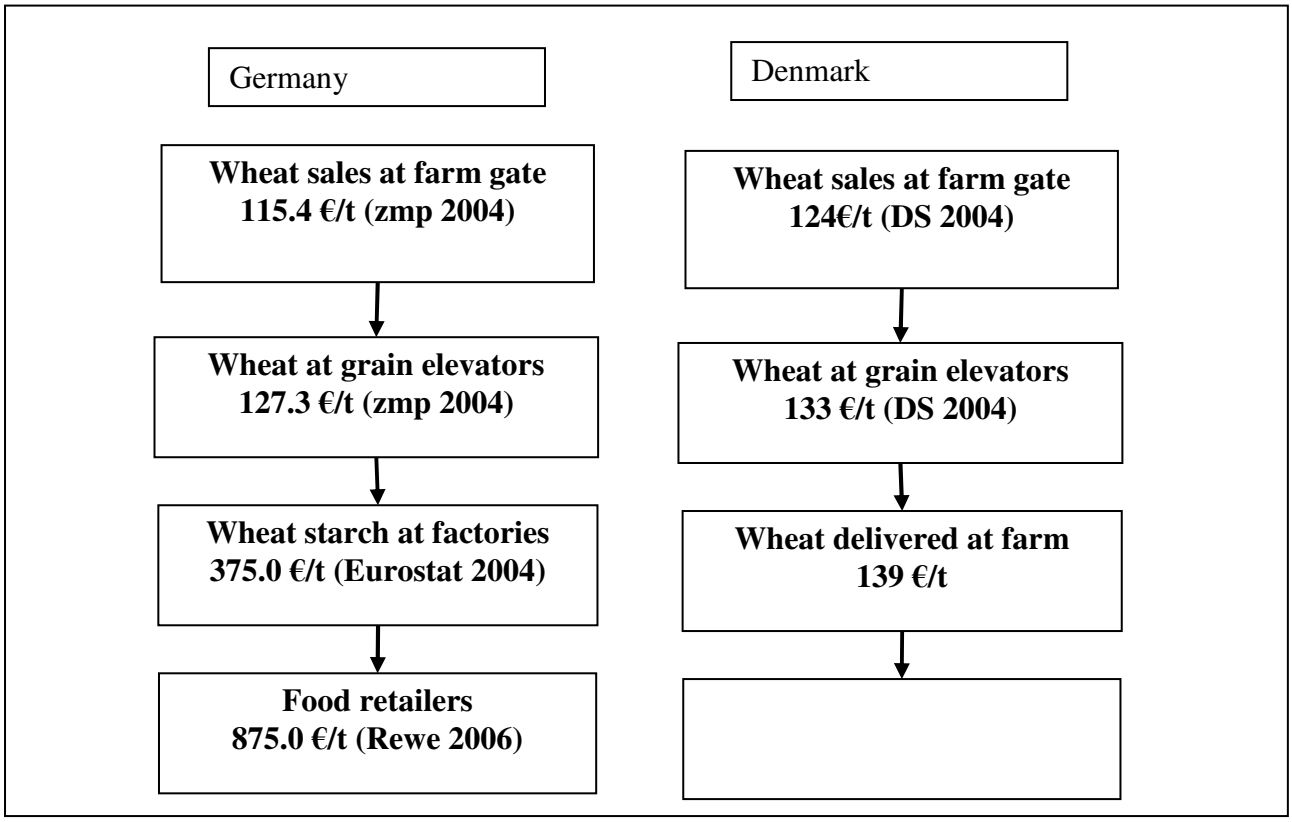

Figure 5: Value added for the supply chain of wheat. The value added for the German case is also representative for the export of wheat to Denmark. DS = Danish statistic 2004 http://www.dst.dk/, ZMP = ZMP Zentrale Markt- und Preisberichtstelle GmbH

From the figure it can be seen that the price of wheat in Germany of a similar quality is lower than in Denmark. Interestingly, the added value (increase in price) from the first step in the chain to the next is roughly the same 10%. This indicates that the handling cost inside the elevator is comparable. Denmark does not produce starch and therefore no data are presented.

Some strategies to separate GM from non-GM are likely to require increased costs to transport. Data have been obtained in order to calculate the costs of transport in Denmark (see table 1).

Distance (km)	Price pr. ton
100	6 €
200	9,52 €
300	12,75 €
500	19,03 €
Crossing Great belt (bridge)	Add 285 EUR for whole load

Table 1. Cost of transportation of wheat grain in Denmark. Dansk Landbrugs Grovareselskab (personal communication)

The average distance from farm to mill or elevator in Denmark is approximately 60 km (Konkurrencestyrelsen, 2002). By assuming an average truckload of 25 tons, the average cost of transporting wheat to the elevator is 6 € / ton., if the bridge over the Great Belt is not grossed.
At the elevator the wheat is tested for moisture and weighted. The cost for this procedure is in average 5.27 € / ton. in Denmark.

Starch industries - Germany
An overview of the German starch industry is presented in table 2.

	1998	2001	2004
Turnover	1.0 Bill. €	1.1 Bill. €	1.2 Bill. €
Production	1.5 Mill. t	1.5 Mill. t	1.5 Mill. t
Raw material	4.5 Mill. t	4.4 Mill. t	4.5 Mill. t
Number of companies	8	8	8
Number of factories	16	15	14
Employees	Around 2,400	Around 2,400	Around 2,400
Raw material processing	4.5 Mill. t	4.4 Mill. t	4.5 Mill. t
Potatoes	66%	66%	66%
Corn	16%	14%	14%
Wheat	18%	18%	18%

Table 2: The German starch industry. Source: Fachverband der Stärke-Industrie 2005

In table 3, the production capacities of German wheat starch companies are illustrated. The main player in this business is Cerestar GmbH with a production capacity of about 400,000 t. The other four companies are all around the same size, but have together a lower production capacity than Cerestar.

Company name	Production capacity
Cerestar GmbH	400,000 t
Pfeifer & Langen	80,000 t
Jäckering GmbH	70,000 t
Crespel & Deiters GmbH	70,000 t
Kröner GmbH & Co.KG	50,000 t

Table 3: Production capacities of wheat starch companies
Source: DLG 4/1997

In Germany grain trading is done by farmers associations (50%), private companies (30%) as well as throughout direct selling from farmers to processors. In order to get a competitive advantage on the grain market, farmers sometimes bundle their supplies (Becker-Weigel 2005). Amongst the companies related to farmers associations, the Bavarian-based company Baywa is the main player in the German grain trade business. Therefore, the income statement of this company is presented in table 4 in order to get a first insight of the cost structure of German grain traders. Main cost positions are raw materials - as it is common for trading companies - with a proportion of 86% on sales. Other major cost category is staff costs with a proportion of 8.5% on sales. In contrast costs of depreciation and amortization as well as other operating expenses are quite low (table 4). In table 4 an overview of the financial situation for the wheat trader is presented.

Financial position	in 1,000 €	In % of sales
1. Sales	6,537,072	
2. Increase in inventories of finished goods	17,523	0.3%
3. Own work capitalized	238	0.0004%
4. Other operating income	98,574	1.5%
5. Costs of materials	-5,643,566	-86.3%
6. Staff costs	-555,572	-8.5%
7. Depreciation and amortization	-91,855	-1.4%
8. Other operating expenses	-294,091	-4.5%
9. Result of operation	**68,323**	1.0%

Table 4: Income statement of farmers association related company (Baywa, Munich) 2005/06
Source: Baywa 2005

Farm supply company - Denmark
In Denmark with a market share of 35-40% of the animal feed market, DLG is by far the largest single player. (Grovvarefussionen, Konkurrencestyrelsen 2002).

In table 5 the annual production of feed for the DLG is illustrated.

	2004	2005
Cattle feed	596	646
Pig feed	1458	1461
Poultry feed	311	314
Miscellaneous feed	48	46
Total production	2413	2467

Table 5: production of feed for the DLG group. Stated in 1,000 tons. Source DLG report 2005.

In table 6 the income statement for Danish farm supply company DLG is presented.

1000 EUR	**2005**
Net sales	1,985,841.69
Production costs	-1,751,468.10
Gross profit	234,373.88
Sales and distribution costs	-165,687.20
Administrative costs	-43,042.48
Other operation income	6,933.64
Other operation expenses	-1,650.40
Operation profit	30,928.76
Investments in associated undertakings	1,926,91
Other investments and securities	4394.06
Financial items, net	-17,157.78
Profits before tax	20,091.95
Corporate taxes	-3,693.54
Net earnings	16398.42
Co-partners share of profit	-1826.78
Profit for the year	14571.64

Table 6 Income statement for the DLG group based on DLG's annual report 2005.

In the case of both Denmark and Germany more detailed information regarding the cost structure in the wheat chain will be obtained from interviews. The preliminary data presents a magnitude of the involved businesses.

2.4. Summary of sugar beet chain (Denmark and Germany)

2.4.1. Introduction

For the sugar production in Germany and Denmark fairly detailed information exist regarding the prices paid for both raw materials as well as for the products through the chain. Some specific data regarding the in-house production has also been found which includes prices on by-products and the mass balances for sugar production inside the sugar factory. The German industry apparently has not been very keen on interviews as they do not wish to participate in a project that involves GMO. They do not, as the rest of the European sugar industry, wish to be associated with GM sugar at present. From Germany fairly detailed income tables and overviews of costs have been presented. The same situation about prevails in Denmark where the only Danish sugar producing company also have a – wait and see – attitude towards the GM-issue.

Further in formation is expected to be gathered through interviews.

2.4.2. Production

The production of sugar beet in Denmark and Germany is illustrated in figure 1 below.

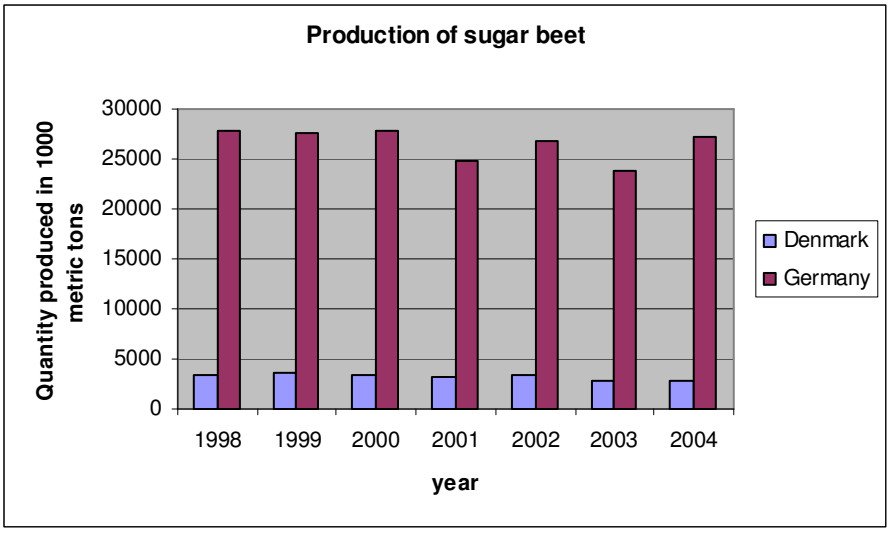

Figure 1: production of sugar beet in Denmark and Germany. Based on FAOSTAT – Agriculture (www.fao.org)

From 1999-2005 the production of sugar beets decreased by 22%. The production of sugar beet is expected to drop further the EU has introduced lower intervention prices as well as lower quotas due to reform of the sugar regime.

Currently 26 sugar plants exist in Germany and only 2 in Denmark. In both countries sugar production is concentrated in a time campaign starting from September and mostly ending in the

following January. Throughout the campaign sugar beets are delivered continuously to the factories according to a strict managed logistical timetable.

The sugar market in EU is strongly regulated and sugar beet production is under contracts between companies and farmers in both Denmark and Germany. Sugar quotas are firstly distributed to the sugar companies which distribute the quotas further on to the farmers, according to the EU market regulation. Because of this contractual relation between farmers and industry stakeholders work closely together and have developed a well organized quality management system for the entire supply chain. Therefore coexistence and traceability systems of GMOs could be easier integrated in the sugar chain than in other food supply chains.

2.4.3. Prices

The market in sugar is highly regulated in the EU. Up till 2005 a fairly complicated system with A, B and C, quotas existed for the prices of beets paid to the farmers. This system has been replaced with a simpler scheme with only one price, see table 1.

Year	**2006**	**2006**	**2007**	**2008**	**2009-2014**
Euro pr. ton beet	43.6	32.9	29.8	26.7	26.3
Euro pr. ton sugar	631.9	505.5	458.1	410.7	404.4

Table 1. Intervention price for sugar beet in the EU (Source; Landbrugets økonomi (FOI), 2005)

2.4.4. Cost structure

In figure 2 the physical flow for sugar production is presented.

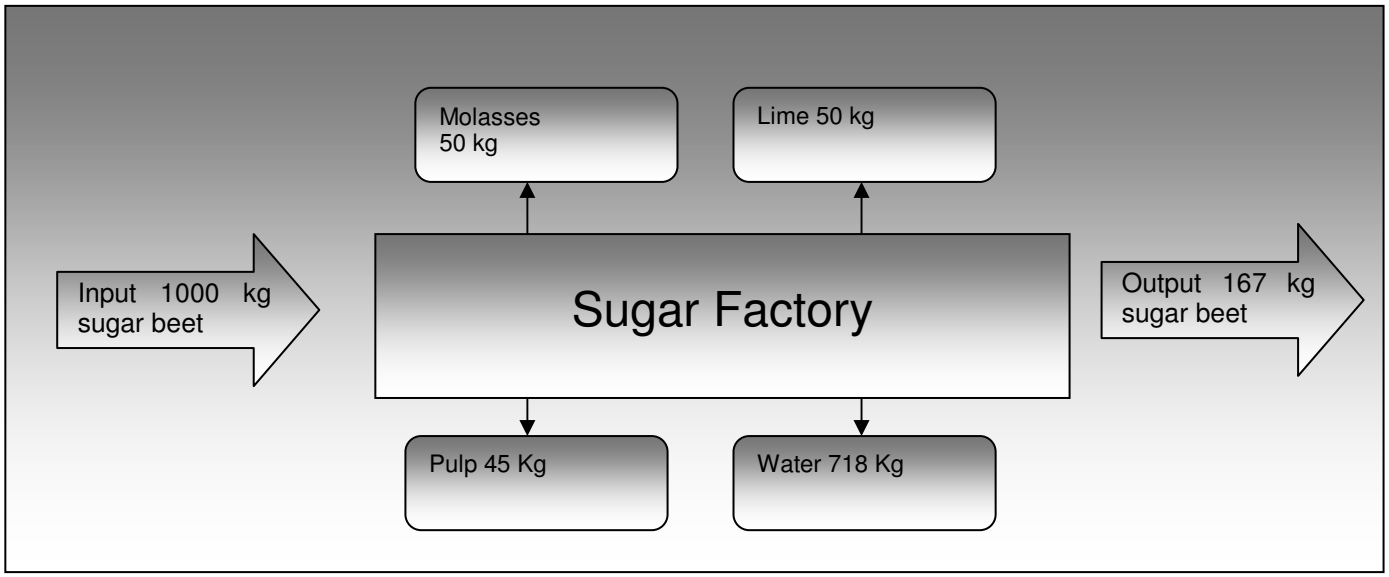

Figure 2. Physical flow of sugar production. Based on interview.

Since sugar beets have a low dry matter content long-distance transport of the crop is quite expensive. Therefore sugar factories are centrally located in areas where sugar beets are cultivated by farmers. In Germany sugar beets are mostly transported by trucks and in some cases by train

while processed sugar is transported by trucks, ships and train. In Denmark transport is mainly done by trucks.

In Germany there are 3 main sugar producing companies: Südzucker, Nordzucker and Pfeiffer & Langen who holds 94% of the sugar market in 2005. In Denmark Danisco is the only producer of sugar and holds roughly the same market share (94%).

Value added
In figure 3 the main added value flow for Denmark and Germany is presented.

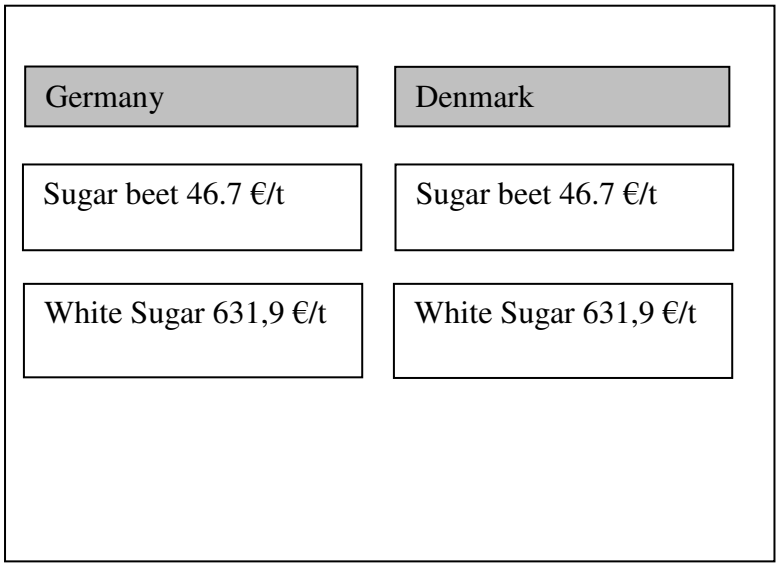

Figure 3: Added value for sugar beet.

Due to the subsidies in EU value added for the two chains are identical.

Prices for by products
In table 2 the current cost structure related to the by-products is presented.

	Denmark (€ / t)	Germany (€/t)
Sugar scrap	112	130
Molasses	106	110
Lime (for fertilizer)	7	

Table 2: Added value of the by-products.

The price of molasses and sugar is valued higher in Germany compared to the Danish market. This can be due to a larger demand but can also reflect higher handling costs. Further information awaits interviews.

2.5. Summary of the soybean chain (Argentina, Belgium, Brazil, Denmark, France and Poland)

2.5.1. Introduction

The Soybean and soy products chain in EU is mainly based on import, USA, Brazil and Argentina being the world largest exporters.

For the soybean production, extensive data have been obtained regarding the evolution import prices showing that the world market price is highly volatile with large yearly as well as seasonal variations. This large fluctuation in raw material poses difficulties when trying to identify the actual share of cost in the chains for the various soybean products.

Fairly detailed information have been shown regarding the cost of producing soybeans in Argentina with variables factors such as farm size, natural soil fertility, proximity to natural fertilizer, distance to market, access to modern machines etc.

When producing compound feed around 80-90% of the total costs is the cost of the raw material. The margins for feed producers have been estimated to be between 0.020 – 0.063 €/kg. With the highly volatile prices for the prices of soybeans the actual profits to cover expenses will vary as well. This effect may be reduced to some extent if the feed producers substitute the content of soy with other products. In term of costs for the non-GMO feed a premium in the range of 5-15 € / ton has been presented by stakeholders.

With regards to the cost structure there has also been presented data regarding the cost of transporting the soybean by ship and trucks. Few data however have been presented on the cost of the in-house production.

In general it has been difficult to link the cost of processing feed to the soybeans only, as the total cost of production and the final price of a product depends not only on the soybean but also on the other raw materials involved in the process. When all the interviews are done more exact data regarding the cost structure for the soybean chain can be presented.

From Brazil data are presented regarding the actual cost of co-existence. By using a certification system the cost of separation for the companies presented vary from 0.25-0.50 € / ton. The experiences from Brazil indicate that for the certified non-GMO the extra premium has been very modest, however one company has managed to increase its market shares considerably. In the case of Argentina we have learned that dedicated supply chains are necessary to preserve non GM identity, as it is currently not possible to preserve the identity of the soy crop when it is stored at the commercial storage elevators. Further information awaits interviews.

2.5.2. Production

In figure 1 an overview of the production of soybeans is presented.

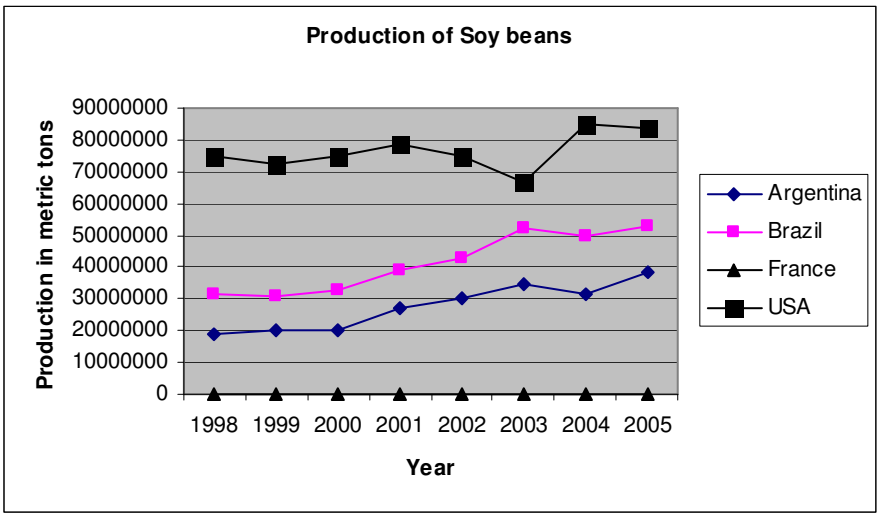

Figure 1: Production of soybeans. USA is presented for comparison, Source; FAOSTAT – Agriculture (www.fao.org)

In descending order USA is the world's largest producer of soybeans followed by Brazil and Argentina. The production of both Brazil and Argentina has been steady increasing over last ten years and there are no indications of any sudden reductions. The production of soybeans in France is negligible compared to these countries.

Brazil is still the main supplier of non-GMO to the EU but the ban on growing GM soy has been abolished. This can make segregation increasingly difficult and hence costly.

In the case of Brazil the future price developments in non-GM soy is crucial. The price premium this far has been very modest and fading compared to the extra costs associated with the non-GM production. If the premiums are not raised in the future more growers are likely to shift to GM crops. For companies that handles and produces soy products the benefits seems larger. The company IMCOPA that handles soy products (oil, meals etc.) has gained large market shares by introducing a third party certification scheme with non-GM.

The Member States of the EU annually import approximately 40 million tons of raw soy products. Half is used in animal feed, either as unprocessed soybeans or as meal/cake from oil crushing. It is estimated that 60 to 90 percent of world soybean exports come from GM plants.

2.5.3. Prices

As the biggest producer of soybeans the USA has a large influence on the world market price for soybeans. The price on the word market is among other things depending on the harvest which in turn is depending on the weather conditions. In years of small productions the prices naturally go up. The prices in soybeans are to some extent buffered by the USA due to their large storage capacity for soybeans. This means that the fluctuations in the world price is to some extend absorbed by the USA. The price development for soybeans has in general been towards falling prices in real terms. This price development can to a large extend be explained by the introduction of GMO soybeans, which have resulted in overall lower production costs at farm level. As the

individual farmer is price taker most of the economic benefit will normally be absorbed by the market.

The price development for non-GM soy has not been optimistic. In Brazil the price premium have been modest and not sufficient to offset the higher costs of producing non-GMO. Some companies have however gained market access by supplying non-GM to the market.
Argentina is considered to be a price taker which means that that they have no influence on world market prices. Prices are fixed in two basic markets. Theses markets are the US ports in the Gulf of Mexico and the ports in Rotterdam, Holland which is the main port of entry for Argentine soybean products entering the EU.

2.5.4. Cost structure – primary production

The costs of producing soybeans in Argentina are dependent on the following factors:

- Distance from producer to the ports (the freight is about 5-8% of the total costs for distances of 200-400 km)
- Size of the farm (related to negotiation power when facing commercialization costs)
- Productivity of machines (scale of economies)
- Soil fertility
- The need to use silos in the field (using silos is expensive but can also result in higher profits because the actual time of selling can be postponed to times of higher prices)

In table 1 the cost of producing soybeans and the profits related to yield pr hectare is presented.

Yield Ton/Ha	0.6	1.0	1.4	1.8	2.2	2.6	3.0	3.4	3.8
Soybean Price May/06 ($/ton)	168.2	168.2	168.2	168.2	168.2	168.2	168.2	168.2	168.2
Gross Income	100.9	168.2	235.5	302.8	370.0	437.3	504.6	571.9	639.2
Commercialization.	15.1	25.2	35.3	45.4	55.5	65.6	75.7	85.8	95.9
Harvest	8.0	13.3	18.6	23.9	29.2	34.5	39.8	45.1	50.4
Farming	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3
Seed+inoc.+fung.	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3
Agrochemicals+Fertilizer	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7
Total Cost	172.4	187.8	203.2	218.6	234.0	249.4	264.8	280.2	295.6
Gross Margin	-71.5	-19.6	32.3	84.2	136.1	187.9	239.8	291.7	343.6

Table 1: Received prices and producers calculated costs for different soybean yields by hectare in US dollars.

From the table it can be observed that the cost of farming, seeds, insecticides, fungicides, agrochemicals and fertilizers are constant whereas the cost of commercialization and harvest is increasing with larger yields pr hectare. The gross margin rises about 10 times when the yield goes from 1.4 t/hectare to 3.8 t/hectare.

In figure 2 the data is presented graphically.

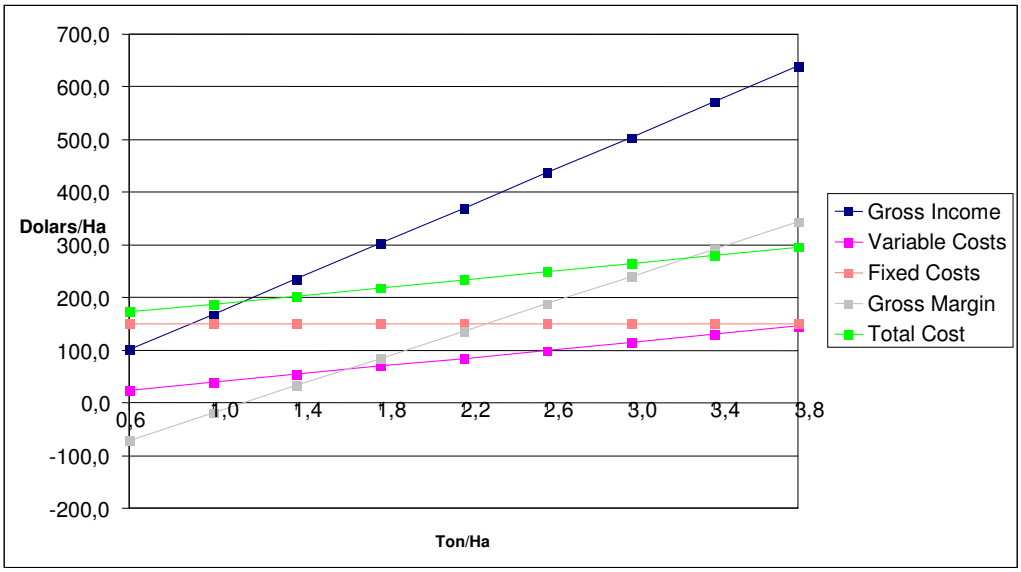

Figure 2. Received prices and producer cost calculated for different soybean yields by hectare, in dollars.

From the figure it can be seen that the gross margin is 0.0 at a yield of 1.2 ton pr hectare.

Compared to Argentina the Brazilian share of GM soy is still quite small. In table 2 the cost of segregation schemes for Brazil is summarized.

Firm	Type Stakeholder	Certification type	Cost of certification	Benefits			
Castrolanda		SGS	0.0 EUR(n.d.)	-New markets			
Agrária		CERT-ID	0.25 EUR	-hope for price premium			
IMCOPA		CERT-ID	0.9 EUR	-Market assess - increased Turnover			

Table 2: Comparison of interviewed stakeholders in Brazil.

Soybean import

The European Union imports very large amounts of soybean products. In figure 3 and 4 the annual imports of soy meal and soybeans to Belgium, Denmark, France and Poland are presented.

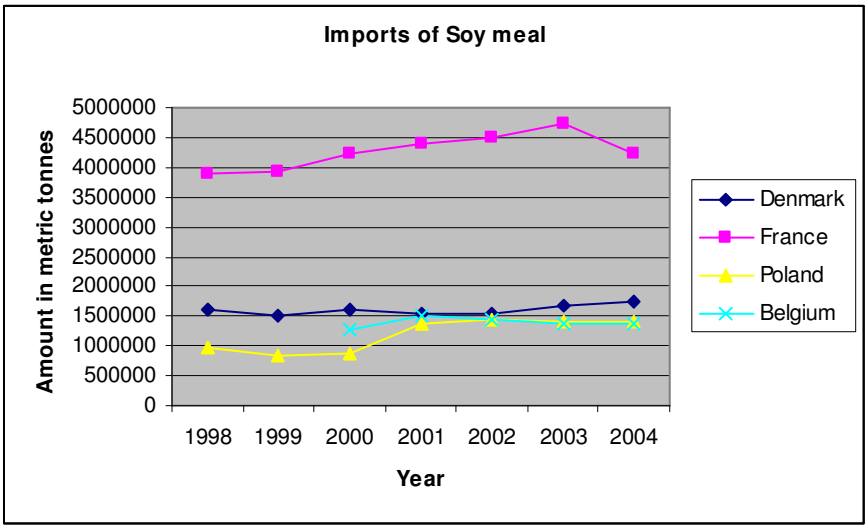

Figure 3: Imports of soy meal to Denmark, France, Poland and Belgium. Source; FAOSTAT – Agriculture (www.fao.org)

France is by far the biggest importer followed by Denmark. The amounts imported by Belgium and Poland are fairly equal. There has been a slight increase in the imports from 1998 to 2004.

In figure 2 the imports of soy beans are presented.

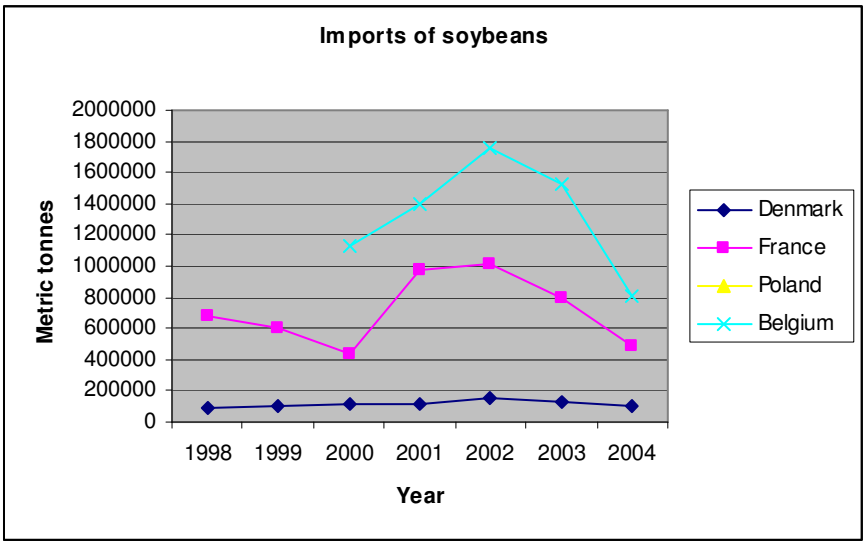

Figure 4: Imports of soybeans to Denmark, France and Belgium. Source; FAOSTAT – Agriculture (www.fao.org)

2.5.5. Prices

In table 3 the available data regarding prices for soybean meal is presented.

€/M. ton	Belgium	France	Denmark	Poland		
GM Soy meal	170 (2005)	211 (1991-01)	178 (2006)	226 (2006)		
Brazilian non GM (0.9%)	185 (2005)	n.d.	n.d.			
Brazilian hard IP[2]	205	+12-15 (2005) +4,5-7 (2006)	+18-20 (2006)			

Table 3: Import prices for soybean meal.

It can be observed from table 3 that a substantial difference in prices exists between the extra costs of non-GM soy meal. Belgium appears to have the highest price difference but also the Danish is quite large compared to the French. It appears that the price of non-GM has gone down substantially in France over the last year. The reason for this is currently unknown. The higher costs of the meal are likely to be due to economies of scale in terms of transport.

[2] Hard IP indicates that the origin of the non-GM soybean is known all the way back to farm level. Hard IP indicates full traceability.

Prices varies substantial over years but also on a monthly basis as shown in figure 5 below for Belgium and in figure 6 and 7 for France.

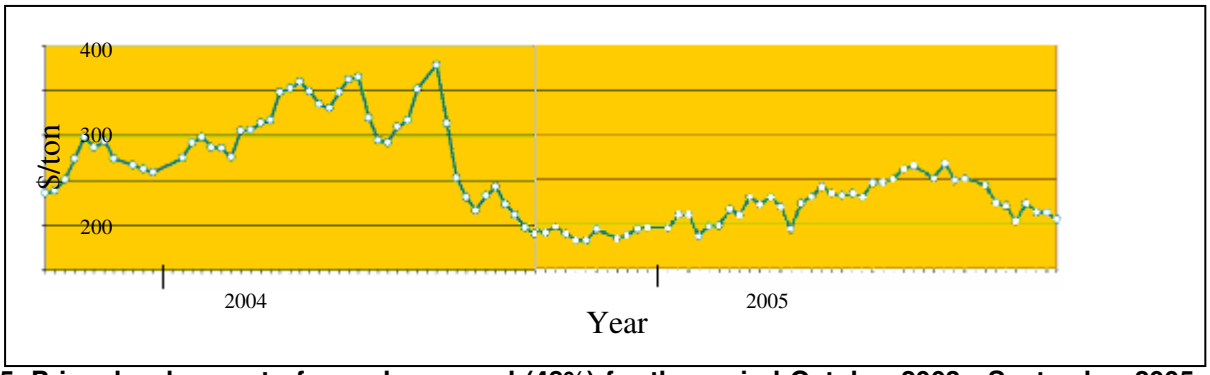

Figure 5. Price development of a soybean meal (48%) for the period October 2003 - September 2005 in Belgium (Source: ASA Europe 2006)

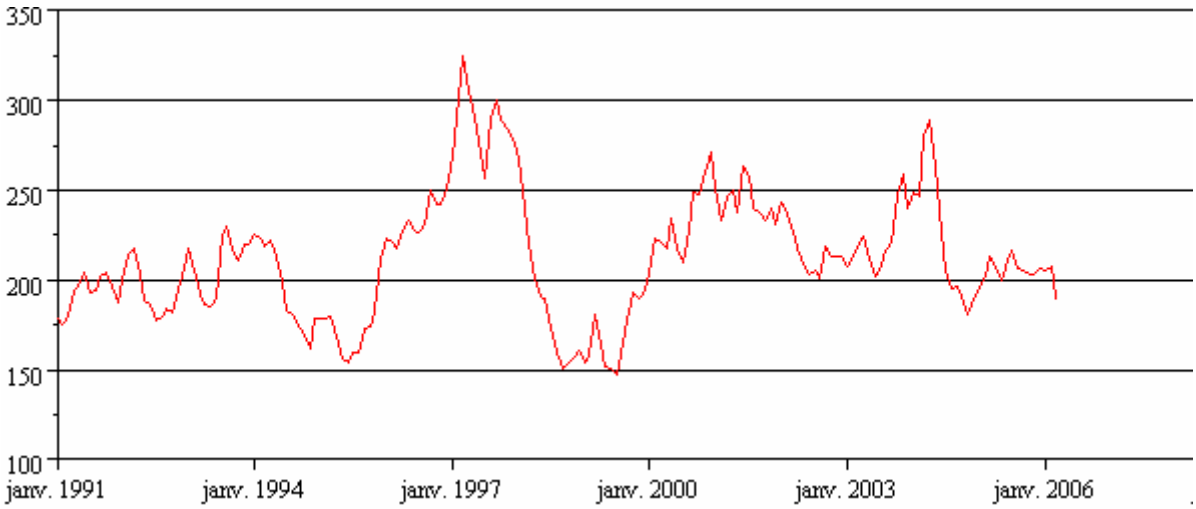

Figure 6 : Price of Soy meal (48% protein)available in Montoir port (France) from January 1991 to June 2006 in €/Ton. (source www.feedbase.com)

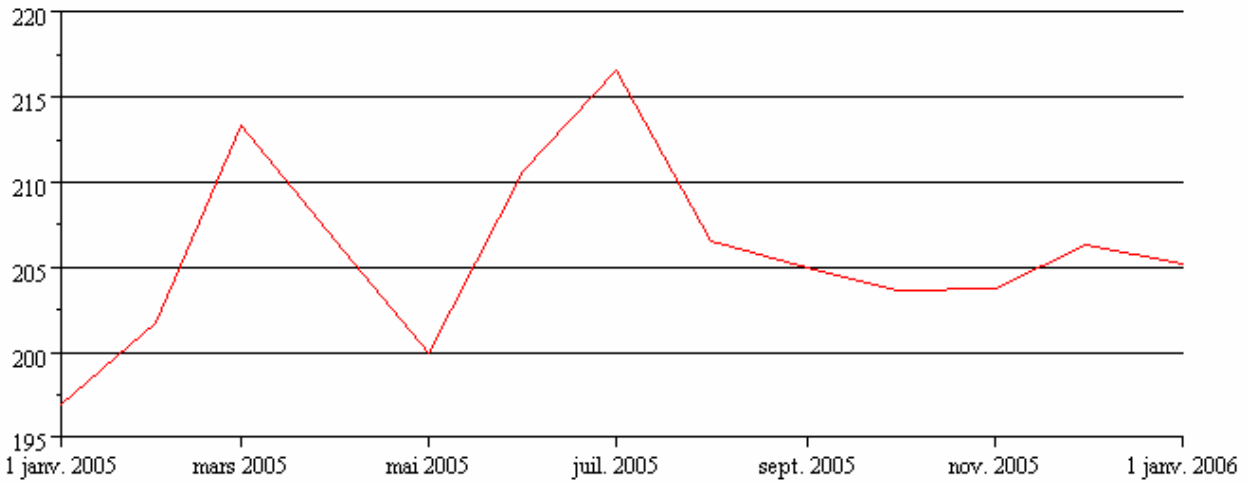

Figure 7: Price of Soy meal available in Montoir port (France) from January 2005 to January 2006 in Euros/Ton (source www.feedbase.com)

2.5.6. Cost Structure for compound feed

In table 4 data the costs structure of compound feed products in the investigated countries are presented.

	Denmark	France	Belgium	Poland
Raw material	70-80%	70-80%	85%-90%	
Additional costs				
Manufacturing			10-15%	
Quality insurance costs (tests)				
Logistical costs	6-8%			
Administration				
Margins			0.025€ - 0.063€/kg	

Table 4. Cost structure of feed production. The percentages relates to total price for the final feed product.

In table 5 some data regarding the extra costs of the final meat products are presented.

€/M.ton	Extra price input	Extra handling costs	Extra price feed non-GM	Extra price Pig meet
Denmark	18 €/ton	26 €/ton	7[3] €/ton	4.6-5.3 €/ kg
Belgium			5 – 7,5 €/ton	

Table 5. Rough estimates of the extra price associated with non-GMO feed compared to GM. Source interviews.

[3] In the calculation it is assumed that the soy meal makes up 20% of the final feed product

From the data presented in table 5 it can be seen that the extra costs of non-GM have a fairly large influence on the final price of the product. The price effect is mainly due to the fact that only a small portion of the cuts from the pig carries the extra costs of non-GM certification, traceability and handling.

In tables 6 the costs of transport of compound feed in Denmark is presented. Data are based on an average size lorry of 30,000 tons.

The transportation of compound feed depends on what kind of fodder is in question. Prices are shown in table 6.

	Price pr. ton €	**Price pr. kilometer €**
Chicken fodder	12.91	1.95
Cow fodder	11.21	1.7
Pig fodder	10	1.42
Any fodder delivered in bag	15.50	-
Average (excluding bags)	11.35	1.68

Table 6. Data based on figures from DLG cited by konkurrencestyrelsen. The price is calculated using 60 kilometres as average distance from factory to farm.