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**Effects of the E.U. Common Agricultural Policy on Arable
Farmers in the Netherlands.
Is there a better alternative?**



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Executive summary

According to the Nederlandse Akkerbouw Vakbond (NAV), which represents a part of the arable farmers in the Netherlands, there is a misbalance in the European trade caused by the implementation of import and export agreements for agricultural products created by European agricultural policy. The intervention prices¹ of EU-cereal declined since the middle 80's and in 1993 they were combined with direct payments².

The misbalance is between a high import of soy and export of processed cereal; due to the implementation of zero tariffs on feed stuffs including soy meal and corn gluten feed. As a result, the livestock farmers were attracted by low prices of these importing feed. Furthermore the continuous aids on cereal production led in a big cereal surplus from Europe which is dumped in the third world market and distorts the world market and economy. Direct payments are supposed to compensate the low prices producers get for their cereal but the overall effect results in a decrease of arable farmers' profit.

This research presents the effects of the current agricultural policy in Europe and the analysis of possible alternative policies to the current CAP and alternative crops to improve the farmers' situation.

For completing this information an historical overview of WTO, the CAP, GATT, The Mac Sharry Reform and the "Agenda 2000 reform" was done, supported with statistical data, literature survey and interviews to experts.

Finally, our analysis concludes that the CAP failed in maintaining the number of farmers and increasing the arable farmer's income in the Netherlands. The current policy is not sustainable, and the direct payments are just short a term solution. An alternative policy will depend on the managed trade of the government to negotiate further agreements. There are also suitable alternative crops which also contain a high amount of protein making the implementation of new crops another alternative solution.

¹ Prices to keep EU prices artificially higher than world market prices

² Monetary compensation for farmer production

1. Introduction

Common Agricultural Policy (CAP) was the result of the conformation of the “European Common Market” and it was implemented in 1962. Its major aim was to increase the agricultural production in Europe after the Second World War. From 1992 to 2003, CAP experienced a series of transformations and changed especially with the so called “Mac Sharry reform” and the “Agenda 2000 reform”. In addition to these two reforms, there were some additional reforms in which European Union has to reduce all the agricultural aids under pressure of WTO to avoid “market distortions” at a global level due to the aids of European agricultural producers.

Since the mid-eighties, Dutch arable farmers have been confronted with a decrease in income. During this time intervention prices of cereal have been reduced and zero tariffs of soy and corn gluten feed have been introduced. Low intervention prices of cereal, in combination with large imports of proteins, made it even more difficult to produce cereal in an economic way.

As a result the income of arable farmers has been negatively affected. Although the government has been giving aids to arable farmer’s production, it has not been enough to counteract the income decrease of arable farmers in the Netherlands.

The aim of this research was to show the negative effects derived from the CAP and to come up with a future scenario for protein import and cereal export in an agricultural policy that will improve the income situation of arable farmers in the Netherlands.

This research was realized by means of reaching two objectives which are listed as: 1) Presentation of the effects of the current agricultural policy in Europe based on statistical information and its potential effects in the next decade. This objective took into account the import trade of soybeans and export trade of cereal on arable farmers’ income in the Netherlands and 2) Illustration of possible alternative policies to the current European CAP so as the Dutch arable farmers’ income will increase. This second objective was based on qualitative information.

The work is composed of five parts: 1) introduction; 2) current agricultural policy in Europe: import trade of soybeans and export trade of cereal and arable farmers’ income in the Netherlands; 3) possible alternative policies; 4) alternative crops and 5) conclusions.

In the second part, an historical overview of WTO, the CAP, GATT, The Mac Sharry Reform and the “Agenda 2000 reform” will be given. The CAP and the effects of protein import in Europe as well as an overview of cereal prices in history in Germany. In addition to that aids involved with European Commission and the European price building system for cereal is included in this part. Finally, a description of the situation of the arable farmers in the Netherlands, such as the number of arable farmers, prices and quantities of cereal and changes in costs for farmers is given out in this part.

In the third part, first a future scenario of the current CAP will be shown, second possible alternative policies of the current CAP and finally alternative crops (legumes, oilseeds and intercropping) for protein import substitution are given.

2. Current agricultural policy in Europe: Effects of soybeans importation and cereal exportation on arable farmers' income in the Netherlands

2.1 Historical Overview

The Common Agricultural Policy (CAP) in Europe was implemented in 1962 as a result of the conformation of the “European Common Market (ECM)” signed in the “Treaty of Rome” in 1957 (Stonehouse, 2000). The creation of a common agricultural policy was a very important issue to increase the agricultural production in Europe after the Second World War, “where agriculture had been crippled and food supplies could not be guaranteed” (European Commission 2004).

According to Howarth (2004) “the original objectives of the CAP, laid down in the Treaty of Rome” in which its principal objective was “to raise farmers' income” that was “perceived too low” in relation to other incomes. In this first period of the CAP, its objectives were the following:

- to increase agricultural productivity;
- to ensure a fair standard of living for the agricultural community;
- to establish markets;
- to assure availability of supplies;
- to ensure reasonable prices to consumers.

At the same time, to deal with these objectives, the CAP was guided by three principles: (1) “a single market, with no internal tariff protection imposed by members states, that allows labour, capital and agricultural products to circulate freely throughout the community at comparable cost; (2) a community preference for agricultural goods backed by an external tariff on imported products into the community; and (3) a sharing of the financial burdens and benefits of the CAP by the community as a distinct entity, rather than distributional procedures to and from members states”(Gray, 2000). These three “guided principles” of the CAP at the beginning of its implementation, were the way in which the EU protected its agricultural production and internal market from other countries to reach its “original objectives”.

According to the European Commission (2004) “The CAP was very successful and, by the 80’s, the EU had to deal with almost permanent surpluses of the major farm commodities, some of which were exported (with the help of subsidies) while others had to be stored or disposed of within the EU”. However, this “state assisted paradigm” (Daugbjerg, 2004) of the CAP, did not take into account the discussion promoted by the World Bank throughout the World Trade Organization (WTO) about the environmental impact and trade market distortions caused by these “assistential” policies in the global context (Stonehouse, 2000). In the 1990’s the EU had to reform the CAP to adjust its original objectives to the new global and regional context of the agricultural trade and production.

To have a better overview of the changes on the CAP policy, information of different institutions will be presented to start with the WTO.

2.1.1. World Trade Organization (WTO)

The WTO was founded in 1995 as the roof organisation for the trade contracts General Agreement on Tariffs and Trade (GATT), General Agreement on Traffics and Service (GATS) and Trade Related aspects of Intellectual Property Rights (TRIPR).

The WTO is an organisation which controls 90% of the international commodity flows. The Chair of the General Secretary has its head office with about 500 members in Geneva. Nowadays, thirty new states want to become a member and negotiate about a membership (e.g. Russia at the moment). The most important criteria for admission are the adoption of the trade agreements and a working market economy. The highest decision board is the council of ministry, which meets every two years and decides about the most important trade issues. The general council encourages and supports the implementation and the execution of the trade agreements and the settlement of controversy between the different member states. The main aim of the WTO is the faster growing of the worldwide markets. This should be reached by:

- Opening of markets and decrease of transport and communication costs.
- Broadening of international goods and attendance exchange
- Increase of the foreign direct investments
- Migration of employers

The WTO is standing on three columns: GATT, GATS and TRIPR. The GATT adjusts the trade of goods and also includes agreements about trade restraints like subsidies. The GATS is important for trade and services and the TRIPS is an agreement to protect patents and business secrets. (Agrarbericht, 2004)

The following paragraphs explain the interrelationship with CAP and two important international agreements such as the GATT and WTO, that influenced the policy making to change the first objectives of the CAP that were previously mentioned.

2.1.2. The CAP, GATT and the WTO

The GATT was created on October 30, 1947 and it has been “later superseded by the WTO” (Stonehouse, 2000) as one important “pillar” to create a “world market”. The objectives of the GATT, as well as, the WTO, have been based on the liberalization of international multilateral negotiation and trade among its country members. However, it was not until the Uruguay Round Agreement on Agriculture “URRA” (1986-1994) that the European Community agreed to include the GATT objectives on the European “Common Agricultural Policy”.

The URRA was meant to reduce trade barriers in the agricultural production to avoid “market distortions” at global level. The “new rules and disciplines” were adopted in the area of market access (trade restrictions affecting imports), domestic subsidies and export subsidies” (Braga, 2004). This agreement was concluded under three areas;

- improvement of import access by reducing tariffs and providing new access and opportunities,
- reduction in the volume and value of subsidised exports and
- reduction of domestic support measures subsidising production”

(Frahan et al., 2004).

Before URRA there were other attempts to reduce barriers for trade in the agriculture sector on the global market. However, some authors agree that “it was not until the Uruguay Round of the General Agreement on Tariffs and Trade (GATT)” that a comprehensive agreement on agriculture was concluded, bringing agricultural sector firmly within the scope of the World Trade Organisation (WTO) rules” (Frahan et al., 2004).

According to Frahan et al., 2004 the GATT agreement was the most “compressive agreement” regarding global trade and tariffs among its 110 country members (including the EU). However, some other authors such as Daugbjerg (2004) agree that in the case of the EU the “US had put heavy pressure on the CAP by demanding the abolishment of all trade distorting agricultural policies within ten years”. In 1994 the “MacSharry reform” was implemented in the CAP to deal with the changing of the agricultural conditions in the EU. At the same time, to fulfil the objectives posed by the WTO throughout the GATT in the global market context.

2.1.3. The Mac Sharry Reform and the “Agenda 2000 reform”

Since the implementation of the CAP in the EU, there were always some transformations and changes on the CAP policies among different periods of time. However, between 1992 and 2000 there has been a major change in the history of CAP with the so called “MacSharry reform” and the “Agenda 2000 reform” (Sckokai et al., 2006). In this period, the CAP has changed its original first “instrument settings” in “instrument policy paradigms” (Daugderg, 2004) It means that the CAP changed the original objectives that were focused on increasing production through protecting its agricultural market to a more liberal market production. At the same time, the policy instruments that were based on subsidies to agricultural production changed to direct payments for farmer production.

The “MacSharry reform” was adopted in 1992 but it was implemented in 1994 (Boreau et al., 2005). According to Howarth (2004) in the “MacSharry reform” the objectives of the CAP were changed on the following priorities;

- To maintain the maximum number of farmers on the land and preserve the rural communities
- To preserve the countryside and the environment
- To avoid the build-up of food mountains
- To maintain good international trading relations and to fulfil the 1993 GATT agreement
- To “decouple” farm income support from production.

Regarding arable farmers, with the implementation of the Mac Sharry reform (Frahan et al., 2004) the process of “shifting farm support on prices to direct payments” reduced support prices”, “created direct payments based on historical yields, and “introduced supply control measures” (Boreau et al., 2005). The Mac Sharry reform of the CAP, involved three basic policy tools: intervention prices, area payments, and compulsory set-aside (Sckokai et al., 2006). The “agenda 2000 reform” was a way to reinforce the goals of the “MacSharry reform” and to include the new country members of the EU to join the CAP.

Regarding the changes of the CAP for arable farmers, there were some recent reforms, such as the “Fischler reform” in 2003 in which “direct payments were decoupled and a flat rate of Single Payments was created” (Daugbjerg, 2004). In the following part an explanation of the current situation of arable farmers with the change of the CAP to “decouple” direct payments, will be illustrated.

2.1.4. The CAP and the effects on protein import in Europe.

The main concern of the European CAP lies in terms of protection and enhancement of the agricultural sector inside its borders. After the implementation of CAP in 1962, Europe is one of the main producer areas in the world regarding arable and livestock commodities. Specifically, since 1970 the European exports have increased in such a way that Europe is now one of the largest net-exporters of wheat, sugar, beef, poultry, pork, and dairy products. This is the result of CAP application which maintained and stabilized the prices inside European borders for many agricultural commodities (Hasha, 2002). However, Europe imports agricultural commodities in such a quantity from other countries that is also considered as one of the major importers of the world on this section (USDA, 2006).

The European livestock farming section is one of the largest in the world. To support and sustain the livestock production, Europe produces rapeseed, sunflower and some soy beans used for animal feed. Nevertheless this production is on a small scale which makes Europe unable to cover its needs in animal feed (Hasha, 2002). This low production of the above mentioned crops was the result of the Blair House agreement (BHA) in 1992 between the USA and EU. This agreement was an important part of the final Uruguay Round Agreement in the agricultural sector.

According to the BHA, Europe should limit its internal production of oilseed crops for human consumption to an adjusted Maximum Guaranteed Area (MGA) as well as the production of the industrial oilseeds on a set-aside area. By this way the European oilseed production area is limited and the overproduction is penalized (Foreign Agricultural service, 2006). This situation forced Europe to import large amounts of animal feed despite the amounts that are produced in its member-countries. It has been reported that the EU imports more than one-fourth of all the concentrates fed within the EU. As a consequence Europe has become the world's largest importer of feed ingredients (Hasha, 2002).

According to the European Commission, proteins are an essential component of all kinds of animal feed for the production of all animal products. Therefore the production and import of feeds containing proteins are important for the fate of livestock. Different kinds of feed contain proteins in a variety of percentages. Animal feeds with variable protein content that are used preferably by farmers in the EU are soy meal with 48%-50% protein content, cereal with 9%-12%, peas and beans with 23%, sunflower meal with 28%, and rapeseed meal with 32%. All of them also contain carbohydrates, but that is less important compared to the protein value they provide (Commission of the European communities, 2001).

Apart from the produced crops that have already been mentioned, Europe is also producing other protein crops such as peas, beans, lupines, hay, grass and silage grains for fodder. Despite the fact that these raw materials are inadequate to meet the needs of Europe, they are considered not very suitable for mono-gastric animals such as pigs and chickens. These animals have difficulties to digest the provided proteins from these feeds. In their case soy meal is considered to be the most suitable protein source. It is very high in protein content and can easily be found on the world market. In addition, soy meal can also be used as feed for ruminants like cattle and sheep (Commission of the European communities, 2001).

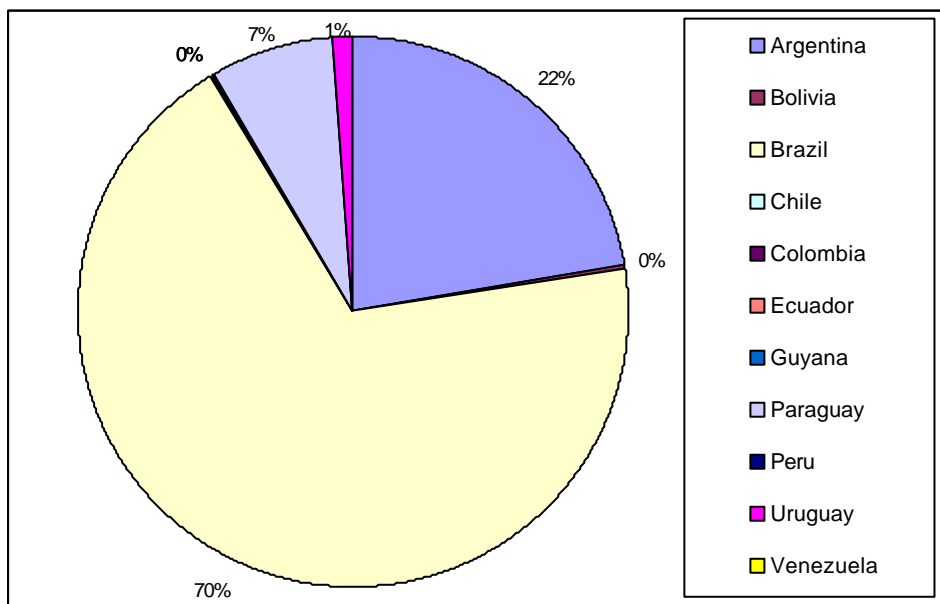
Soy has been reported to appear in European countries since the 1600's as an ingredient used to produce food for human consumption (Fengshuitours, 2006) and ever since the import is continually increasing. Over the last 25 years the production of soy has increased tremendously due to high demand from many countries of the world, including Europe, in order to cover the needs of their animal industries in feed. Another reason is the diseases in cattle, such as Bovine Spongiform

Encephalopathy (BSE) which was detected for the first time in 1986. The result affected the cow meat production negatively and shifted the consumer's preference to pork and poultry, leading to the increased import of soy meals (Hasha, 2002).

The EU with its 25 member countries is the second largest importer of soy holding a share of 31% of world importers (van Hofwegen, 2005). The main producer countries of soy in the world are the USA, Brazil, Argentina, Bolivia and Paraguay with very high export volumes (Reeder et al., 2005).

Some South American countries are developing to be main exporters of soybeans. The U.S. share of global soybean and soybean product exports has steadily diminished due to the phenomenal growth of foreign soybean outputs and exports, particularly by Brazil and Argentina.

Figure 1: Exporters of soybean in South America.



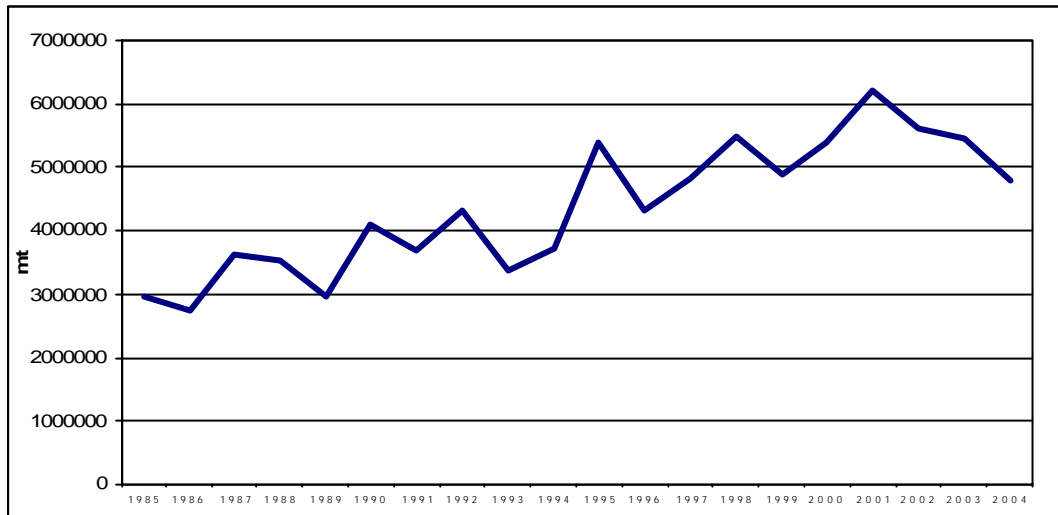
Source: Elaborated with data from FAO3 agricultural statistical data. <http://faostat.fao.org/faostat/>

Figure1 shows the main exporters of soybean in South America. According to the pie chart, it goes without saying that Brazil is the largest supplier of soybean in South America, followed by Guyana, Paraguay and Uruguay. It can be seen clearly that other countries export much less compared to the four countries mentioned above.

³ Food and Agriculture Organization of the United Nations (FAO)

Within Europe, Netherlands is the largest importer of soy. Regarding world data possesses the second place between all soy importer countries (van Hofwegen, 2005). This import comes from countries of South America and 96% of it is processed as animal feed (Profundo, 2006).

Figure 2: Import of soybean in the Netherlands.



Source: Elaborated with data from FAO agricultural statistical data. <http://faostat.fao.org/faostat/>

Figure 2 shows that the import of soybean in Netherlands increased in two decades, from 1985 to 2004. Although it experienced fluctuations and dropped at different time points, at last it climbed from 3.000.000 MT in 1985 to more than 5.000.000 MT in 2004.

The Blair House Agreement, the BSE and the high demand from many countries around the world for animal feed created a distortion to the European agricultural market. The major causal agent of the European market distortion is the absence of import levies on imported feed stuffs with main concern to soy meal and the corn gluten feed used for animal consumption. Europe agreed on the duty-free import of these feed stuffs in the Dillon Round under negotiations of the GATT in 1962. As a consequence the non-tariff feeds provided a relatively cheap substitute of the European grains used for fodder which of that time were found in the European market in very high prices (Hasha, 2002). Ever since, within the Netherlands, the Dutch farmers were attracted by the very low prices and as a result high amounts of soy were imported (Wossink, 2003).

The zero-tariff imported feeds quickly replaced the feed-grains produced in Europe in such a level that a decline in their use for feed appeared around the 1980's. Specifically, the use of feed-grains produced in Europe decreased by 11% from 1984 to 1992 while the total feed use increased by 9%. Consequently the prices of grains decreased dramatically. At that point the European policy makers realized that this replacement of European feed-grains by imported feeds created a serious distortion in the European market which resulted in an increase in European grain surpluses (Hasha, 2002). These surpluses of European grains were dumped in the third world countries creating a bigger distortion in their local market as well as in the world market (Lichfield, 2003). Europe asked to raise the import tariffs on oilseeds during the Uruguay Round in order to get the market in balance but this request was not accepted (Hasha, 2002).

2.1.5. Overview of cereal prices in history in Germany

The following overview gives insight in the decrease of wheat prices in the last twenty five years in the German market, because it shows the similar decline of prices like in the Netherlands.

Table 1: Overview of cereal prices in Germany

Year	Important steps of the agricultural EU policy	average wheat price in €
1975	The EU imports yearly 20 mills. tons of cereal	
1981	EU had reached the self-sufficiency border for cereal for the first time	
1983	The average of 100 kg wheat was 24.81 €	24.81
1985	The EU production increases. The commission froze the price for cereal	23.47
1988	The so called joint responsibility rate decreases the revenues	20.86
1991	Amount of Intervention reached 19 millions	18.92
1992	Backlog of cereal in the EU double as high as in the USA; Oil market regulation started in the EU	18.61
1993/1994	Start of the "agricultural-reform": revenue was reduced" significantly" and basic acreage payments and at least 15%	14.30
1994/1995	again decreasing of the intervention-prices and increasing of the acreage payments, the first time that the market reacts again and revenues above the intervention price	14.42
1995/1996	third time decreasing of the intervention-price instead of this the force of closure was decreased on 10%	13.80
1996/1997	intervention-inventory without importance, because of exporting of 25 mill. Tons	13.42
1997/1998	Very big harvest in Europe (205 mill. tons), Intervention-amount 15 mill. Tons	12.84
1998/1999	EU decided about new agricultural policy (Agenda 2000) Bad harvest because of very bad weather	11.97
1999/2000		12.21
2000/2001		12.35
2001/2002	reform of the agricultural policy planned but no main line to see, prices in the agricultural production increases significantly wheat price	11.78
2002/2003	Decision of decoupling of aids from the acreage	11.12
2003/2004	very dry year and together with international events significantly increasing of the prices, EU with ten new members	13.41
2004/2005	last year before the reform, worldwide the highest harvest ever, prices at the lowest level	10.10
2005/2006	first decoupled year, the farmer can decide which crop to breed without checking the acreage aid	10.00

Source: BBG, 2006.

2.2 European price building system for cereal

The Council of the European Union, which has an important role in the price building system for the EU, consists of ministers coming from the governments of each member state of the European Union (Wikipedia, 2006).

The council sets up the market organisations. First the majority of the Commission consults the European parliament and then the proposal with the new suggestions is accepted to form the market organisations.

The European Commission (formally the Commission of the European Communities) is the executive body of the European Union. Alongside the European Parliament and the Council of the European Union, the European commission is one of the three main institutions governing the Union (Wikipedia, 2006).

To determine the price for cereal the European Commission is helped by a committee to measure the implementation of the operations of the market organisations. For the market organisations the main tasks are fixing the prices for agricultural products in all European markets and granting aid to producers and operators in the special sector. Furthermore they have to build up a mechanism for controlling the production and organizing the trade with non member countries.

The prices for the products are fixed by the Council for products according to the following steps; first, the council has to consult the parliament and consider a proposal offered by the Commission; after that, the council can only act in case a majority was reached. In other words the council, the parliament and the Commission make decisions together and the Council fixes three different prices at the beginning of the marketing year for the different products. These prices are:

- **The indicative price** (basic price or guide price) is the price transactions should take place at. The indicative price is close to the price which the products would normally command on the Community market.
- **The threshold price** (sluice gate price) is the minimum price at which imported products can be sold. It is higher than the intervention price and encourages Community economic operators to buy within the Community, so respecting the principle of Community preference.

- **The intervention price** is the guaranteed price under which an intervention body designated by the Member States buys in and stores the quantities produced. In order not to burden the Community budget, the Council encourages private storage by granting a premium to producers who store products themselves (Damm, 2005).

Since the 1992 reform, in some sectors higher direct payments to farmers offset lower intervention price, this means that direct payments are higher and consequently intervention prices are lower. The stored products may be denatured, used for humanitarian purposes or sold by the Commission. Sales are by tender and the Commission decides in advance on the destination of the products. If it sells on the internal market, it ensures that markets will not be disturbed". (EU webpage, 2004)

The different types of aid have been changed in 2003 after the CAP reform 2003. The period to implement the new changes varies with the different products, but in general the direct payment starts at the 1st of January in 2005. Here every member state can decide to postpone application of the new arrangements until 2007 at the latest for particular agricultural reasons.

Farmers who want to apply for aid must fulfil a number of cross-compliance conditions, which makes sure that they produce in a sustainable way. The aid is based on a reference time period (2000-2002). These conditions which farmers have to fulfil are to maintain the land in a good agricultural condition and "comply with the standards on public health, animal and plant health, the environment and animal welfare (cross-compliance)".

The EU will reduce the direct payments progressively until 2012; here it starts with 3% in 2005, 4% in 2006 and then 5% annually (digressively). This reduction is called modulation. The savings out of the modulation are for financing the new rural policy in the European Union.

These changes are an advantage for the WTO negotiations, because the market is more liberalized and the production does not get any (production-) subsidies anymore.

"To offset the loss on income suffered by the producers of certain sensitive crops with the move to the system of single farm payments, a new aid or supplementary premium has been introduced (EU report, 2006)." The support of farmers is based

on a basis of 63 euros per ton of grain multiplied by the determined average yield of grain in the region.

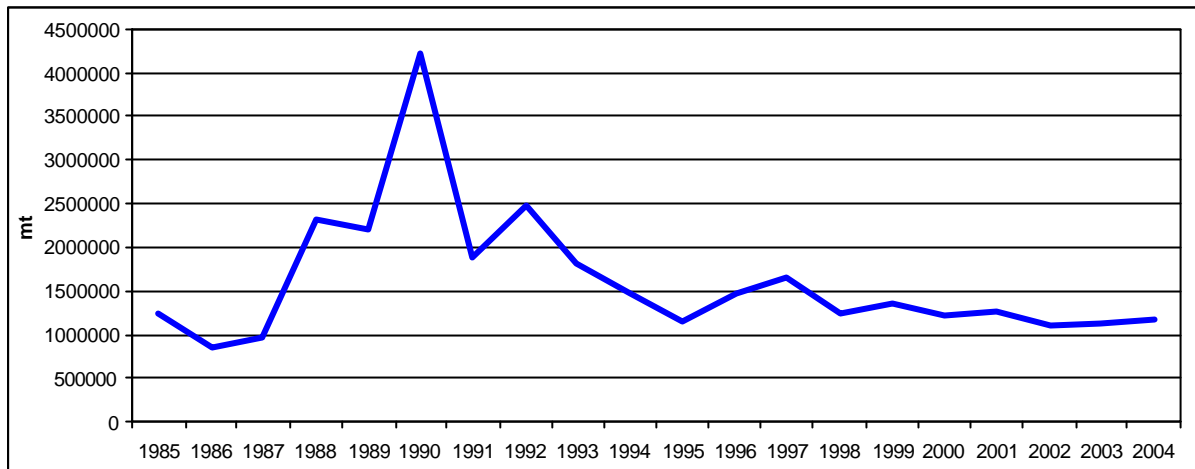
All farmers which are independent on their production may apply for direct payments. There are specific support schemes for protein crops, energy crops, seeds, arable crops and many other plants. The main aim is to ensure a greater income stability for farmers and their families. Farmers can decide themselves what to produce in response to demand without losing their entitlement to support. If they do not comply with the cross compliance rules because of negligence, then the direct payments may be reduced by between 5% and 15%. In case they do not comply in a deliberate non-compliance way, payments will be reduced by at least 20% and the producers may be completely excluded from receiving aid. (EU-report, 2004)

2.3 Situation of the arable farmers in the Netherlands

For a better overview of the effects of the agricultural policies it is important to look at the current situation of the arable farmers. The prices in agriculture are influenced by a couple of developments and factors. Structural developments are the growth in productivity, the market ratios and the policy. Initially the common agricultural policy has been made to support the farmers and guarantee good prices to give arable farmers a good income. In order to assess whether this goal has been reached it is important to see the effects of policy on the income of arable farmers. Therefore the number of farmers, the prices and the amounts of cereal, the amount of subsidies given to arable farmers and the cost of production will be investigated.

2.3.1. Prices and quantities of cereal in the Netherlands

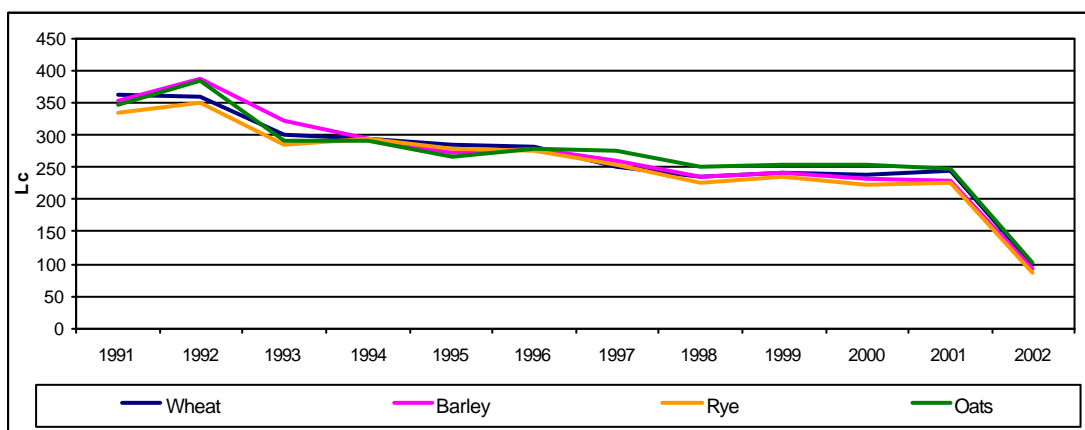
Figure 3: Development of the quantities of cereal in the Netherlands.



Source: Elaborated with data from FAO agricultural statistical data. <http://faostat.fao.org/faostat/>

From Figure 3 it can be seen clearly that the quantities of cereal in the Netherlands experienced a great fluctuation during a twenty-year period, namely, from 1985 to 2004. In the first five years, the quantities of cereal raised from 1,250,000 in 1985 to 4,250,000 in 1990. From 1990 the quantities dropped heavily to 1,250,000 in 2004 although they still fluctuated before 2004.

Figure 4: Development of the prices of cereal in the Netherlands.

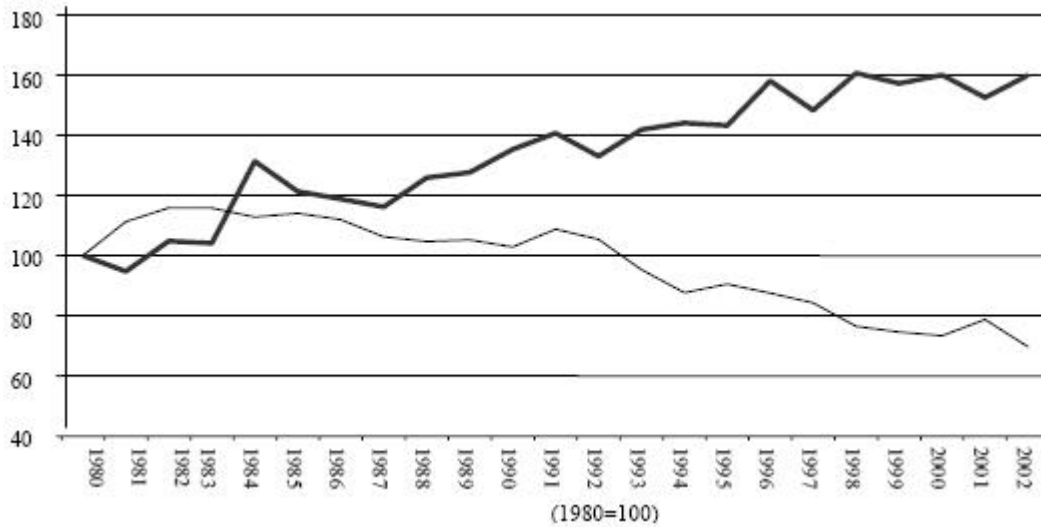


Source: Elaborated with data from FAO agricultural statistical data. <http://faostat.fao.org/faostat/>

In the figure 4 it is clear that the prices of cereal in the Netherlands had an obvious drop in a decade. From 1991 to 2002 the prices dropped about 70%. The prices of all cereal (wheat, barley, rye and oats), got a reduction from 350 in 1991 to

250 in 2001. After 2001 a more steep line appeared for it, from 250 in 2001 to 100 in 2002.

Figure 5: Development in quantities and prices in the EU15



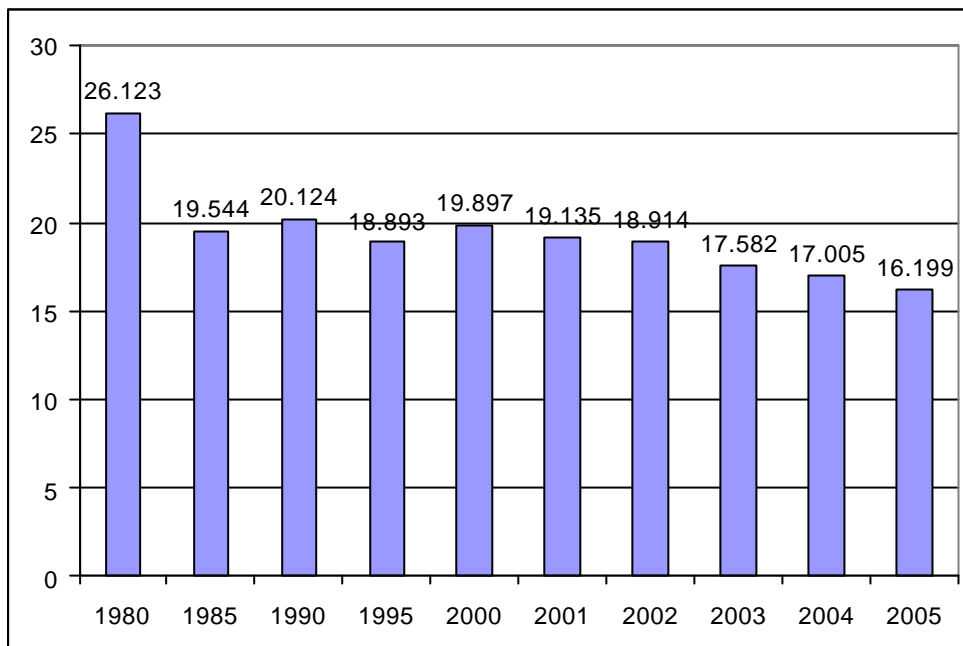
Source: *Development in quantities and prices in the EU15 (Bond and Bolhuis, 2006)*

Figure 5 shows the development of prices and quantities of cereal in the European Union. It is clear that in these years the production has gone up fast, about 60% in 22 years, whereas the prices of grains have been decreased about 30% over the past 22 years.

These data explain the distortion created by the direct payments in the cereal market. The direct payments maintained the cereal production even if there is no market for it. This causes a surplus that at the end is sold in developing countries at cheap prices, causing distortions their economies too.

2.3.2. Number of arable farmers in the Netherlands

Figure 6: Agricultural companies with cereal in the Netherlands



Source: Elaborated with data from Landbouwtelling op national niveau, 2006.

It may be clear from figure 6 that the number of farmers with cereal decreased drastically. In 25 years almost 10.000 farmers have stopped with growing grain. This shows that a lot of farmers have stopped farming which causes abandoning of the countryside where only few farms are left. The decrease in the number of farmers has a lot of causes (e.g. the increase in farm size or the union of different farmers working together under one farm) but it is too bold to address it to one certain aspect. In figure 2 and 3 the development of quantities of cereal in the Netherlands is shown for 1985 approximately 1.250.000 mt of cereal was produce in the country. In contrast with 3.000.000 mt of soybean imported to the Netherlands in the same year.

With respect to the number of farmers we can say that apart from the first year (1980-1985), where the decrease of number of farmers was over 6.000 the decrease in the number of farmers is stable. In the other years after 1985 the decrease was a little over 3.000 which is still a lot considering that this is about 15%.

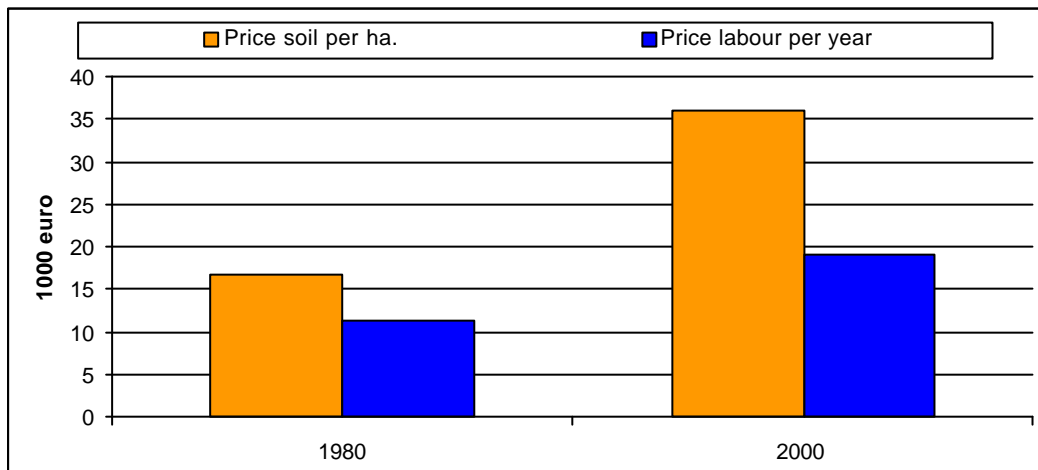
Through these figure there isn't a clear evidence of a relation between this huge decrease and the number of farmers in the period of 1980-1985 (figure 6) and the price of cereal (table 1). The price of cereal was still high at about 24 euro per 100

kilogram that period. However the decrease in prices of cereal also have influenced the number of farmers; as can be seen in the general trend of lower cereal prices through the years (table 1) and a decreasing number of farmers (figure 6).

2.3.3. Changes in costs for farmers

For the costs of the farmers it is interesting to see what changed over the last 20 years. In the costs two major parts are identified, the price of soil and the price of labour. Apart from that there are costs for fertilizer, machinery and seeds.

Figure 7: Changes in price of production



Source: Elaborated with data from FAO agricultural statistical data. <http://faostat.fao.org/faostat/>

The costs for farmers have increased in the last 20 years. They have doubled regarding prices of soil per hectare, and also the labour costs have grown a lot.

2.3.4. Changes in income of cereal for farmers

To address the changes in income of cereal this research used a German example which might be viewed as similar to the Dutch situation. The outcome of this research can be found in table 2. This overview excludes the effects of inflation on the price; this will even make the decline in revenues from cereal bigger. However in this way it is already illustrative that there has been a big decrease in gross benefit (revenues for farmers) from 1688 euro in 83-84 to 1166 euro in 05-06 which is a decrease of almost 30%.

Table 2: Overview of changes in revenues for cereal

	Units	1983/1984	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Yield	dt/ha	63	82.81	85.12	77.92	87.21	84.65	90.67	74.36	72.83	88.24	81.56
Revenue	dt/ha	24.81	13.42	12.84	11.97	12.21	12.35	11.78	10.96	13.41	10.1	10
Taxes	dt/ha	1.98	1.27	1.22	1.17	1.1	1.11	1.06	0.99	1.21	0.91	0.9
Gross revenues	dt/ha	26.79	14.69	14.06	13.14	13.31	13.46	12.84	11.95	14.62	11.01	10.9
Gross market service	€/ha	1688	1216	1197	1024	1161	1139	1164	888	1065	971	889
Retirement	€/ha		-129	-119	-136	-148	-143	-152	-124	-113	-106	-99
Aid for retirement	€/ha		34	32	41	41	32	35	38	28	28	28
Cereal price adjustment	€/ha		318	318	318	318	324	348	348	348	348	348
Gross benefit	€/ha	1688	1439	1428	1246	1371	1352	1395	1148	1285	1242	1166
Difference between the previous year			54	-11	-181	124	-19	43	-248	138	-43	-76

Source: BBG, 2006.

2.4 Conclusions

Since the implementation of the Common Agricultural Policy there have been different changes to manage agricultural trade and production of cereal. As a result of the zero tariffs in soy import implemented in the 60's, it became more attractive for European livestock farmers to use soy as fodder rather than to use the European production of cereal to feed animals. As a consequence, the prices of cereal decreased dramatically in 80's, when the EU farmers reached a surplus in production.

The EU, trying to defend farmer's income and production and reducing the European costs introduced subsidies on cereal. These first CAP policies made the farmers to continue producing big amounts of cereal in Europe creating a surplus on cereal production in the 80's, and causing a global market distortion.

To avoid this market distortion, there was a strong international pressure with US leading to change the CAP regarding the exportation subsidies. In the 90's with the GATT agreement, these exportation subsidies were changed by direct payments to farmers in EU. Nowadays the CAP trend in the EU policy is to reduce and decouple the single payments to farmers and to transfer the fund to environmental development of rural areas.

These changes of CAP have been a way to enhance agricultural production in Europe, to increase the income of farmers and to preserve rural communities. However CAP failed to meet these goals regarding the current situation of cereal farmers in Europe

With respect to the situation of arable farmers in the Netherlands it is clear that the amount of farmers has decreased the past 25 years. A factor that is responsible for the decrease of the number of farmers is the low price of cereal based on the data retrieved in the last 20 years.

The amount of cereal produced in the European Union 15 has increased over the last 22 years whereas the prices have decreased. Quantities have gone up with about 60% and prices have gone down with about 30%.

For the Netherlands however this is not the case. The decrease in price is much higher (70%), and the direct payments don't compensate for this decrease in cereal price. This means that the farmers in the Netherlands have to deal somehow with this negative effect on their income. Furthermore the current policy for cereal tends

to reduce the aid for farmers which mean an even worse situation in the coming years for farmers who produce cereal.

Prices of production have gone up, taking into account two important components (labour and prices of soil) through that the cost of production is higher than before.

It's is obvious to see the necessity of changing the current agricultural policy in a way that there will be opportunity for arable farmers to make a decent living.

3. Possible alternative policies

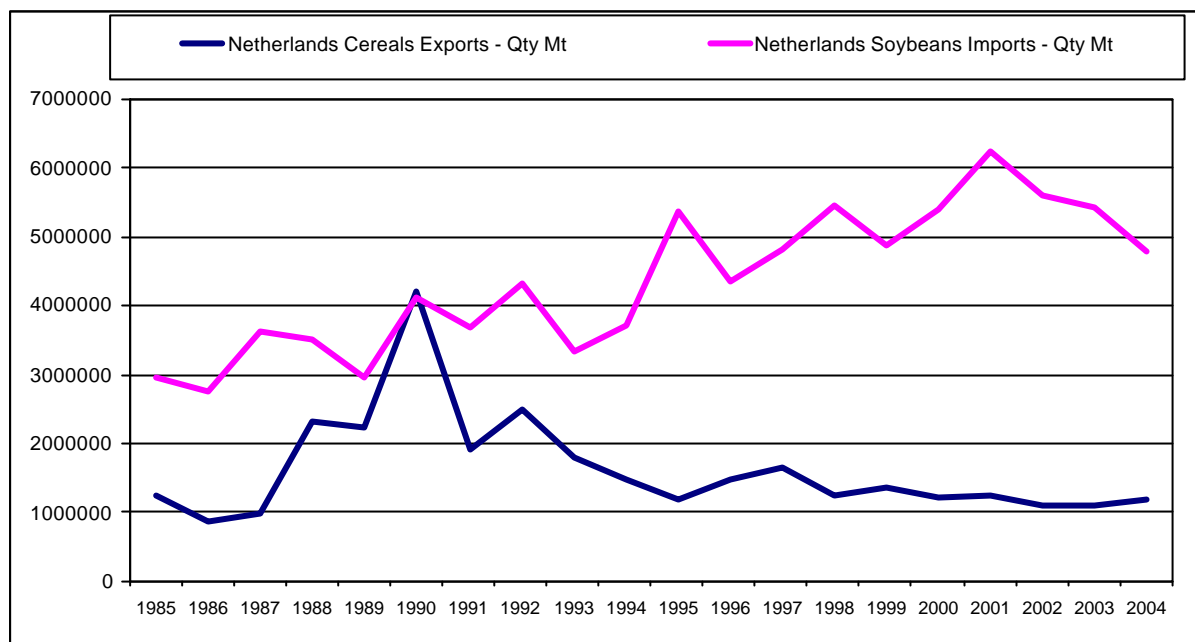
Regarding the possible alternative policies this research first explains the problems of the European CAP with the help of experts. After that, four possible alternative policies will be addressed: the agricultural aids for the farmers, the increase in the direct payments, the EU Market Regulation instead of direct payments and the managed trade. Finally there will be a general conclusion about possible alternatives policies.

3.1. Problems of the European CAP

Direct payments in the EU were created to reduce the European intervention costs. But it was not possible to increase farmers' income and to compensate the farmers' loss from low prices of cereal caused by the free import of soy and gluten feed. So the direct payments in cereal production in the Netherlands have failed to compensate production cost and increase farmer incomes, instead the cereal-processing industry benefits from the policy in the CAP (Schoenberger, 2006).

In Figure 8 the imports of soybean and exports of cereal for the Netherlands are shown, this gives a good overview of the market distortion over the years. The imports of soy with no tariff and therefore cheap for the livestock farmers who don't use the cereal produced in the Netherlands anymore. Therefore there are cereal exports with subsidies which make them cheap enough to sell on the world market; this causes distortion in as well the European as the world market.

Figure 8: Import of soybean and export of cereal in the Netherlands



Source: Elaborated with data from FAO agricultural statistical data. <http://faostat.fao.org/faostat/>

The whole policy is inhibited through the centralized system in Europe and the lack of self-market regulation within the whole agriculture. Through this there is no sustainability for the market orientated agriculture and farmers. There is not a positive selection at the moment, but this will be necessary in the future if the framework of the policy will not change (Tracey 1989). The current policy allows the farmers to survive but doesn't give good possibilities for farming in the future. Fewer farmers are successful and many farmers have only a small income, because also the free markets are affected by the CAP (Lischka, 2006).

It would be better for the EU farmers and the European agriculture to be more competitive and get a bigger income within 10 years again. Furthermore there is a need for better and similar condition prices for agricultural goods (diesel, etc.) within the EU, to create a good basis for fair production and with that fair prices of agricultural products (Schoenberger, 2006).

In perspective of arable farmers the problem with the EU-policy is the lack of a target or vision. Nobody thinks about a different future, and nobody thinks about a possible shortage in agricultural products e.g. in ten years because of high demand from India and China (Schoenberger, 2006).

3.2 Alternative policy for CAP reforms

The CAP in order to adapt its policies to the global liberalization trend of the WTO has strongly influenced the managed trade of international market prices. The aids given to the farmers to produce in the EU reduced the prices of cereal, causing a misbalance in the cereal market. Nowadays, the main trend of the CAP is to decrease farmer aids in order to avoid market distortions. However, it reduced dramatically the arable farmer's income and also reduced the possibility of farmers claim "to develop a sustainable family farming in Europe which gives priority to the supply of European internal market" (CPE & COAG, 2004).

For example, in the forum of NGO/CSO they discussed "food sovereignty" as a farmer's right. To understand the rights which countries have according to food it is essential to look at food sovereignty. What is Food Sovereignty? Food sovereignty is the right of people to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent to which they want to be self-reliant; [and] to restrict the cheap selling of products (dumping) in their markets. Food sovereignty does not negate trade, but rather, it promotes the formulation of trade policies and practices that serve the rights of people to safe, healthy and ecologically sustainable production (NGO/CSO, 2002).

Nevertheless, is there a possible alternative policy that could help to increase farmer's income without distorting the global market prices? The following part is going to analyze the pro and cons for the agricultural aid and agricultural market liberalization and how these issues affect arable farmers' income in order to have a clear picture to a reformed CAP.

3.2.1. Agricultural aid for farmers

The average income of household farmers is lower than the average income of non-farm households. At the same time, the low income of farmers, compared to other incomes, has tended to reduce the number of farms declining the employment in the agricultural sector in the EU (International agriculture and trade reports, 1999).

The uncertain situation about maintaining aids of farmers for agricultural production over the next decade and the low prices of cereal in the global market

make the situation of farmers also uncertain. In case this situation favours the unemployment and growth in agricultural income the latter will be lower unless the government subsidies increase significantly (International agriculture and trade reports, 1999). The following part of the work will deal with a hypothetical case of increasing direct payments to deal with the problem of farmers' income and its consequences.

3.2.2. Increasing direct payments

The direct payments in cereal production in the Netherlands have failed to compensate production costs and increase farmer's income. Furthermore, the reduction of direct payments for farmers can severely reduce even more the income of arable farmers in the future.

However, one possible alternative to change the CAP policy would be to increase the direct payments to farmers instead of reducing them. However, the increment of the direct payments has to be done according to the general economic situation. Nevertheless, is it possible to increase the direct payments to give farmers a "decent" income compared to other incomes?

One of the main reasons to reduce direct payments rather than increase them has been the budgetary cost that represents the EU budget. At the same time, the budget of EU comes from the taxes of all the people (citizens) in the EU. As a consequence, if the direct payments increase, the EU budget will be also expanded to pay direct payments.

According to some authors, such as, Thompson et al., (2002), the direct payments that support cereal farmers to ameliorate the negative effects of the liberalization of tariffs, result in a gain to consumers, but a loss to producers.

The reduction of import tariffs succeeded to lower the price of agricultural products for consumers. However, this cheap importation of products low the price of the domestic agricultural production in the Netherlands and as a consequence the price of cereal in the internal market is lower than cereal production. In addition, the direct payments did not compensate the losses of cereal production costs since cereal can not compete with the cheap agricultural products that come from abroad. Furthermore, according to some authors, even if the EU budgetary cost rise to

maintain direct payments farmers to deal with the market liberalization, the net aggregate welfare for the society in total will be positive (Thompson et al., 2002).

Positive consequences of the direct payments would be that the small agricultural structure could survive in the Netherlands and the sustainability of the agriculture could increase and farming in general would be done in a better way. Also the economy profits from more and small farmers because they invest more money into the economy (e.g. more tractors) than only a few big farmers.

However, the direct payments or subsidies to compensate the import and consumption of cheaper agricultural products from abroad can also have negative consequences. For example, the direct payments create a surplus of some agricultural products such as cereal (Mohd, 2003). The EU surplus of cereal is dumped in other countries for a lower price than of the real price of production in order to compete in the global market. As a result, the EU budget for direct payments has to increase every time to compensate the continuous lowering of the global agricultural products.

In conclusion, this alternative is not a long-term solution to increase the income of arable farmers in the Netherlands and in the EU in general. It is just a short term solution that does not solve the problem of the decreasing income of arable farmers due to the low prices of cereal. Moreover, direct payments result in lowering the price of some agricultural products in the global market. Therefore, direct payments are also a momentary solution to maintain farmer's income and negatively influence farmer's income in the rest of the world.

However, if the main reason for the decline in the income of arable farmers was caused by the free importation of soy and gluten-feed agricultural tariffs. Then, why EU government does not regulate the market prices? The next alternative policy is going to deal with a hypothetical case of internal regulation of the market.

3.2.3. EU Market Regulation instead of direct payments

Regulating the local prices for agricultural products means that the national governments (in this case the EU) have to regulate the prices of products. This case also has its pro and cons. There is a big discussion among social scientists between those that are in favour of a "total" liberalization of the markets and others that are against it. The first trend, deals with the issue that prices have to be regulated by the

global market itself. The second trend, deals with the participation of the nation states to regulate market prices (Martinussen, 2004).

However, this part of the project will just take into account the hypothetical case that the EU governments will support the consumption of arable farmer's production in the internal market taking into account the following two aspects:

- 1) Setting restrictions to the import of proteins and energy
- 2) Controlling the prices of the agricultural internal market.

Setting restriction to the import of protein and energy could avoid the import of huge amounts of these products which are used for animal feed. This restriction can allow arable farmers in Europe to fulfil the local demand of proteins and energy ensuring a market for the local production. At the same time, with the internal regulation of prices the state can set higher prices for agricultural products according to the real costs of production.

The advantages of this reform could be 1) to ensure a market for the arable farmer production 2) higher revenues for local agricultural products 3) to avoid the paying of direct payments for agricultural production 4) more money in the EU budget to spend in other issues and 5) to avoid the international dependence of protein production.

However the EU government has to deal with the external and internal pressure that can be created in the case that these reforms would be done.

One of the big external problems to change the CAP is the international agreements that the EU signed. The new rules and disciplines signed by the GATT were adopted in order to liberalize the global market (Braga, 2004). The EU commitment with the country members of the WTO was based on the improvement of import access reducing import tariffs, and the reduction of subsidised exports and domestic support measures subsidising production (Frahan et al., 2004).

This situation and the further international trade agreement to liberalize the global market have affected negatively the EU farmers. However this also brought benefits to economical growth of the EU (Thompson et al., 2002). So, the modification of the CAP to protect the agricultural sector in the EU is difficult to change due to the internal and external pressure of bigger economical sectors that benefit with the market liberalization. However, the change in the CAP policy will also depend on the capacity of the EU government to negotiate the international agreements.

Another problem is the internal pressure that the EU would have from consumers. In case of the EU regulation of internal market, the prices of agricultural products such as cereal have to be adjusted to cover the “real cost” of agricultural production, and definitely the price will increase for consumers. However it is not clear in which way the price for agricultural products are going to increment and affect consumers, taking into account that an average of 50%-60% of the GDP goes for household consumption expenditures, including food (UNECE, 2006).

A further analysis of pro and cons of alternative policies could be done. However, the success of a change of the CAP policies will depend on the negotiation between the different stakeholders such as politicians, farmers, consumers, international agencies, etc. Moreover it will be crucial to do further research to see the effects of a possible change of the CAP in the society, like who it is going to affect, in which way and also if it would be a solution to counteract the negative effects. Doing so, a further reform of the CAP can be directed to have a policy according with the local reality and claims of the farmers.

Nevertheless, if these changes imply a negative consequence for most of the people of the EU, new alternatives have to be created in which the arable farmers also can benefit from the market liberalization in EU. The next section will address also a specific market regulation which is called managed trade.

3.2.4. Managed trade

A special managed trade could be a solution. There can be a free market, but within certain boundaries. This can be explained with help of an example, currently the dairy farmers experience a quota on their milk: they may freely produce till their quota is full but once they go over it they will get a penalty. In this way for dairy producers it isn't interesting to produce more than the quota because they do not earn money (when subtracted the penalty) under normal conditions, they will approximately produce the amount of milk that corresponds to the quota.

This might be also applicable for the import of soy. The set of a certain quota for the import of soy can counter the problem of cereal surplus in the European Union. Once the amount of quota is being reached a penalty is introduced in order to stop the high amount of soy imports. As a consequence, the price of soy would be too high for livestock farmers to buy it and they will search for other alternatives or

decrease their production. By this way the amount of soy imported can be limited which will also stimulate the development and implementation of new crops.

It is also applicable for the export of processed cereal. Once the export of the quota of processed cereal has reached its maximum amount a penalty will be given for exporting and in this way the exports will be limited. The price of (processed) cereal would be too high in that case compared to the world market and would not be bought. As a consequence the prices of (processed) cereal would drop and it would not make sense to export (processed) cereal anymore and in the future the amount of processed cereal exported would decrease. In that case they would not be sold in the world market and it would not destroy other markets in less developed countries. As a result, farmers in other countries would profit from this.

These quotas have to be based on the exports and imports which countries had in a certain basic year but regarding the export quota there should be a discount in order to get world market prices on an acceptable level. The European Union sets certain boundaries. Within this system countries may decide how to support their farmers. The quota would not cause that this support leads to cheap European cereal on the world market (dumping) or importing limitations. To increase the flexibility and achieve a more efficient specialization, it is possible to make the quota tradable between countries (Koning et al, 2005).

In this way the amount of imports and exports are totally controllable by the European Union with relatively few rules and a, till certain extend, free market for its farmers.

3.2.5. Suggestions by economic and plant experts

According to the interviewed experts Dr. H. Schoenberger and Dr. G. Lischka the following suggestions arise. An obligation a government has is that they must provide affordable food for its society; this should be the superior target of the national economy. People that do not have a big amount of money should have good and cheap food. In general the market should rule and the state and the government should place the framework. In this way entrepreneurial farmers get assistance in the best way (Lischka, 2006).

It is not an alternative to increase the policy with tariffs and avert the trade, because trade brings in a lot of cases benefit, and intercultural exchange helps

economies. In other words it is not sustainable to protect markets with tariffs. The intervention has no sense anymore and so it should be abolished, because grains should not be provided without a market. In the future a solution for farmers is to use the surplus grain for producing regenerative energy (Lischka, 2006).

The policy is aiming in the farms' success. Therefore it is not right to pay for all farms the same. A judgment of the structure of the farms has to be done. If the EU provides direct payments then it should pay the farmers only for cultivation-handicaps, or farmers should be allowed to increase their fields. The aids should be paid only for conservation of the cultivated landscape and to control diversity. This would mean in general no payments at all, but for structural and market disadvantages there is a reallocation necessary (Schoenberger, 2006).

The aid should be simplified. The EU should not give money for the farm size (money*hectares) but for the average unit size multiplied with the amount of hectares. For example with an average field-size of 50 hectares the income of the farmer is over proportional high as with an average size of 5 hectares. It could be a solution to differentiate the big average value gets only 50 €/ha and the small average farm gets up to 300 €/ha. Only with a blatant handicap, for example to keep the environmental structure, the EU should give subsidies (Schoenberger, 2006).

The protein-aid is with 57 € and has no adjustment for the legumes. A protein aid is in general not a solution, but it could be possible to reduce the dependency of soy (Schoenberger, 2006). In the CAP trade restrictions are hard to realize because the EU would get under pressure in the WTO and agricultural products are not so important for the EU's trade (Lischka, 2006). Therefore, new negotiations are necessary.

The same regulations are needed everywhere: protection of employment, environmental standards, e.g. no soy from former rainforest regions. For this a climate protection-tariff could be useful (Schoenberger, 2006). But protecting tariffs for the rain-forest is difficult to realize because there is no traceability. Tariffs are always the wrong way for trade flows, because the benefit for the society decreases (Lischka, 2006).

2.3 Conclusions

To increase the direct payments to the farmers it can not be seen as an alternative to reform the CAP policy in order to improve the income. It is just a short term solution that does not solve the problem of the decreasing income of arable farmers.

EU market regulation can be another alternative to increase farmer's income. However, the changes of the CAP policies in this way can bring some internal and external problems if it is not correctly designed. However a deeper analysis of pro and cons and in more specific details on this alternative policy has to be done in order to come to a more concrete plan.

The success of a change of the CAP policies will depend on the negotiation between the different stakeholders such as politicians, farmers, consumers, international agencies etc. Doing so, a further reform of the CAP can be directed to have a policy according with the local reality and claims of the farmers to have a more sustainable agriculture.

A special managed trade could also be a solution. There can be a market, but within certain boundaries. In this way the amount of soy imported can be limited which will also stimulate the development and implementation of alternative crops. It is also applicable for the export of (processed) cereal. Once the quota of export of is reached a penalty will also be given for exporting to limit the amount. In that case they wouldn't be sold in the world market and would not destroy other markets in less developed countries anymore, so also farmers in other countries would profit from this.

Another alternative which was mentioned by the interviewed experts is to judge the subsidies by the structure of the farms. This means subsidies only for structural disadvantages, if it is not allowed or possible to change them. If the society does not want for example changes in the landscape it has to pay for this. In this case aids would only be paid for conservation of the cultivated-landscape and controlled diversity. These payments should be simplified for the average unit size multiplied by the amount of hectares. The advantages here would be that big farms, which are working very effective, would not reach a high amount of subsidies, so it could be possible to reduce the amount of subsidies for the EU. A disadvantage could be that the amount of cereal in the world market would not decrease. However, the

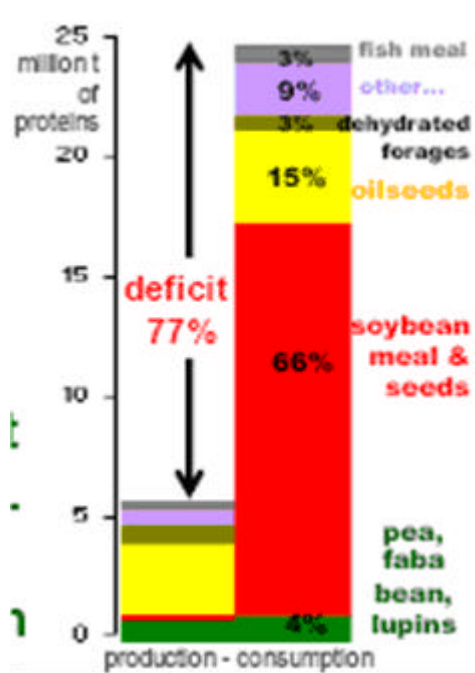
alternatives represent a point of view of two interviewed experts which is in general not in line with the best interest for the Dutch arable farmers' income. This research is aiming at the increase of income for Dutch arable farmers and therefore it will deny the majority of the suggestions of these experts since they aren't beneficial for the Dutch arable farmers' income.

4. Alternative crops for grain import substitution

Upon the illustration of the negative effects derived from the zero-tariff importation of soy on arable farmers in Europe, the necessity for cultivation of alternative protein crops in the European borders has become stronger. After all, this proposition is part of the European Farmers Coordination (Coordination Paysanne Europeenne) suggestions that were demonstrated under the support of the European Commission (CPE, 2003). This proposition could play an essential role in maintaining and enhancing the European livestock and arable production, re-establishing the balance in the market, evaluating the products with the worthing prices and wining back the consumer's preference to European products (CPE, 2003).

Alternatives for cereal should be products which can be suitable for feeding animals. These products can replace the high percentage of grains that currently is grown and exported. This makes the import of soy smaller as well as the export of grain. In figure 9 the current difference in production of protein and consumption of protein in the EU 25 is illustrated (GL-pro, 2006).

Figure 9: Protein Sources in EU 25 in 2003-2004



Source: GL-pro, 2006.

The deficit in protein production is very high (77% in 2003/04). This deficit could be decreased by the cultivation of crops with high protein content instead of grains. In that case there would be a more balanced situation, since the circle would become more closed and the amount of transportation would be reduced.

According to the European Commission the protein crops that can substitute soy meal are mainly oilseed crops like rapeseed and canola, leguminous plants and in a smaller percentage cereal (Commission of the European communities, 2001). Due to the lower protein content compared to soy these crops can not replace soy individually. Therefore they should be used in combination with each other in order to provide a suitable protein meal for each animal fodder.

This section is focused on alternative protein crops for soy regarding their characteristics, protein content, yields and costs. Finally a conclusion considering the potential to be adopted by farmers around European countries will be addressed.

4.1. Alternative crops

4.1.1. Legumes

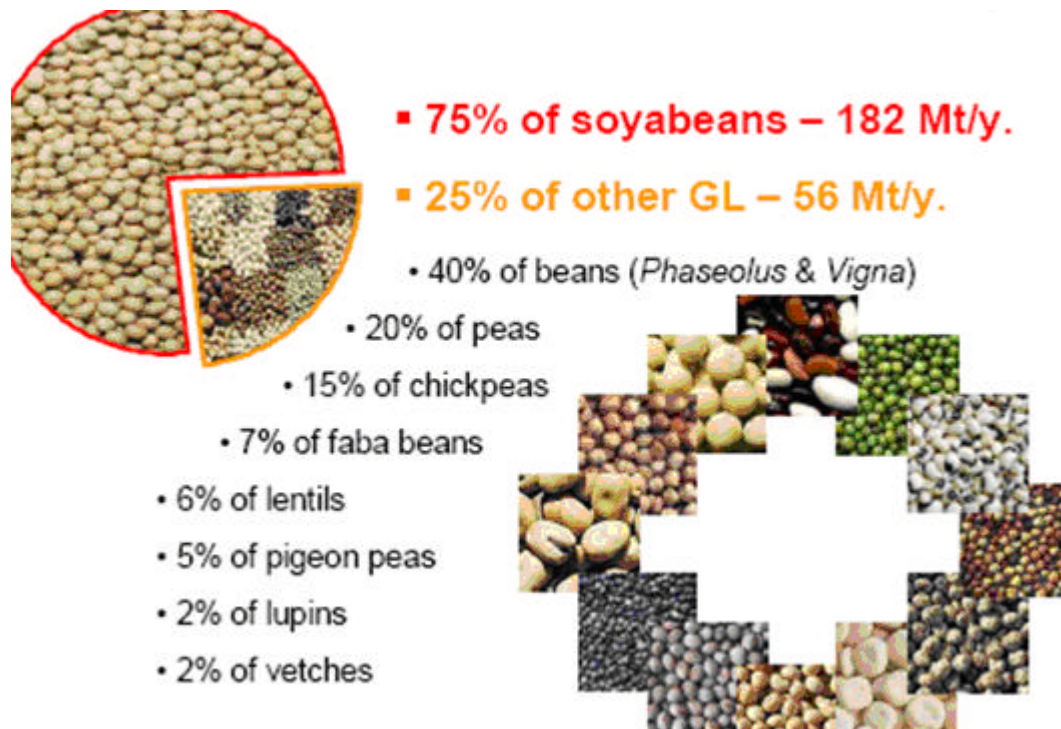
When looking for crops with high a percentage of protein that can be grown instead of cereal legumes have to be addressed. Legumes are characterized by the following: they create flowers, they produce pods which contain the seeds and unlike other cultivated plants they have the ability to use atmospheric nitrogen (N₂) to produce their own protein compounds by means of symbiosis with nitrogen fixing bacteria in nodules. The ability to use atmospheric nitrogen is beneficial because they need a reduced amount of N-fertilizer and also they “fertilize” the following crop in the rotation. These legumes contain a high amount of protein (between 25-40%), amino acids and are therefore useful for producing animal feed.

The legume crops have great potential in Europe which currently has 1-5% of its arable space for legumes in contrast to outside Europe where this space is 25-35%. Although there are more than 40 species of legumes in the world, EU currently lacks an adequate supply of these high protein resources and imports them from abroad. The organization GL pro which stands for Grain Legumes pro has as its objective to contribute to the development of European grain legume production as a major source of protein rich material for animal feed. As GL pro quotes “Grain legumes are environment-friendly crops. They add diversity in crop rotations, they have the ability

to fix atmospheric nitrogen and they are particularly relevant for sustainable agricultural systems.

In figure 10 the world production of legumes is shown and the percentages the different types of grain legumes have in this world production (GL-pro, 2006).

Figure 10: World production grain legumes



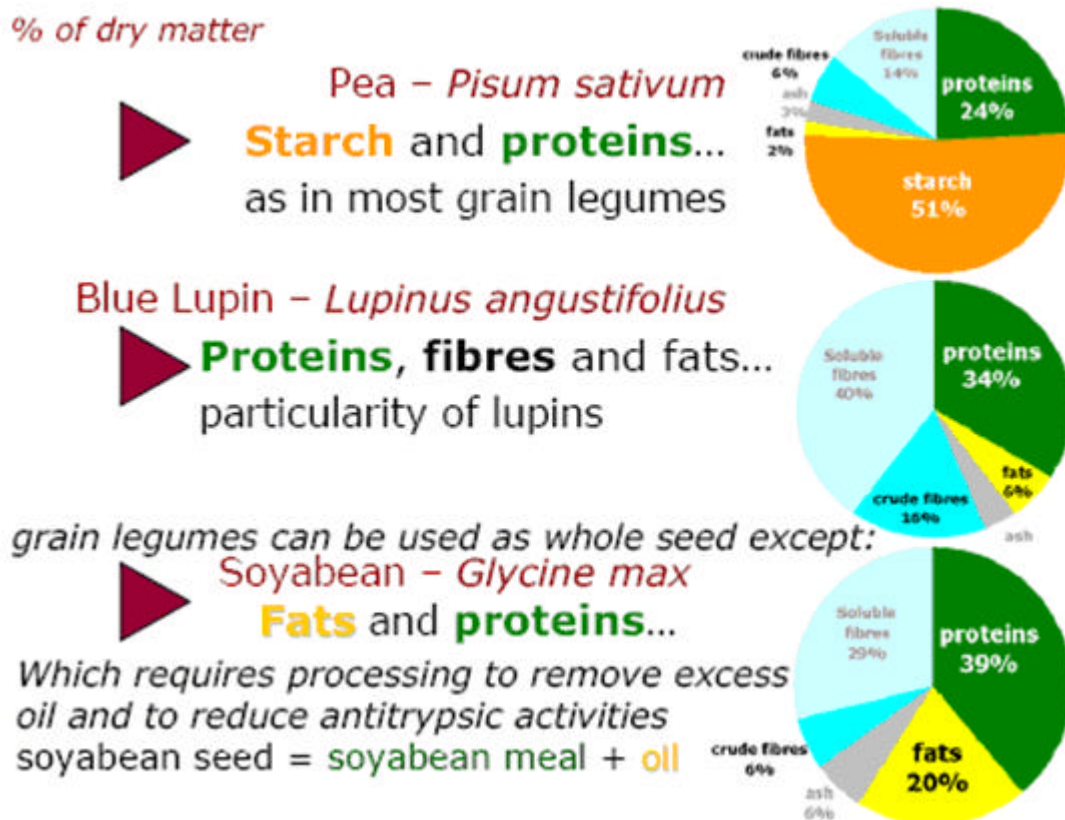
Source: GL-pro, 2006.

There are two types of legumes. The first type is grain legumes which contain for example of soybeans, peas and lupines. The second type is forage legumes and this type contains for example clover and Lucerne.

Grain Legumes:

These types of crops look like they are promising for feeding pigs and chicken because they contain a high level of protein. In figure 11 three types of grain legumes and their composition is shown (GL-pro, 2006). The protein content of especially blue lupine is interesting for feeding animals. It is 5% lower as that of soybeans which is currently mostly used for feeding pigs and chicken. Peas don't look that interesting on themselves but in a combination of crops they may be feasible as well. Also a possibility to use peas is to intercrop them, in section 4.2 more of the intercropping principle will be explained.

Figure 11: Three types of grain legumes



Source: (GL-pro, 2006)

Forage Legumes:

Forage legumes seem less interesting for replacing fodder for pig and chicken production; they contain a protein level of about 20% which is too low for feeding pigs and chickens. However these products are useful for feeding cows. Examples of forage legumes are Lucerne, grasses and all kinds of clovers.

4.1.2. Oilseeds

Rapeseed-Canola

Rapeseed belongs to the family of Brassicaceae and is also known as Rape or Oilseed rape. The most commonly used species in agriculture are *Brassica napus* and *Brassica campestris* (Asa-europe, 2006).

Brassica plants have been considered being among the oldest cultivated crops in human history. Many Brassica species appeared to be used in India and China (Hort Purdue, 2006) but Europe is reported to be the origin continent of *Brassica napus*

and *Brassica campestris* since they have been cultivated there from about the thirteen century (SIU, 2006). Initially they appeared in Mediterranean area and then expanded in Belgium, Germany, Denmark and Sweden. During the World War II these crops were introduced to South American countries and to Canada (Oplinger et al., 1989). This broad expansion is attributed to their characterization of easily adapted plants to most of the climatic conditions. It is remarkable that are very tolerant to water salinity and to a great range of photoperiod length and soil PH (SIU, 2006). Because of their high tolerance in saline soils, they were the first crops that were used in the drained dikes in the Netherlands (Hort Purdue, 2006).

Origin and Uses of Canola

The main purpose of cultivating rapeseed since the first years of its appearance was the production of oil for fuel, illumination and soap manufacturing (SIU, 2006). Later on it started being used for human consumption, animal feed and lately for bio-diesel from industries (Asa-europe, 2006).

The natural rapeseed was found to have very high erucic acid content which is toxic to humans and glucosinolates content that have breakdown products also toxic to animals. Therefore in 1968 plant breeders from Canada developed a variety of rapeseed with low erucic acid content. This variety called "Canola", coming from "Canadian oil, low acid" attribute that was given (Asa-europe, 2006) and characterized as "the edible oilseed rape" (Oplinger et al., 1989). This given name to the special rapeseed variety was registered officially by the Western Canadian Oilseed Crushers Association in 1979, in order to describe the so-called "double-low" varieties. This characterization is used for the produced processed oil from rapeseed which contains less than 2% of erucic acid and for the produced rapeseed meal which contains less than 3 mg/g of glucosinolates (Oplinger et al., 1989) According to the standards of the European Community defined in 1992, the double-low rapeseed must have less than 20 $\mu\text{mol/g}$ of total glucosinolates (Oplinger et al., 1989).

Canola is low in saturated fat (5%-8%) compared to all vegetable oils and high in polyunsaturated fatty acids (30%-35%). Additionally, it gives 40%-44% oil and 23% of protein. Possessing these characteristics it can easily be compared to soy oil and protein content which is 20% and 40% respectively (Oplinger et al., 1989).

The processed oil of Canola gives a high quality meal for animal fodder due to its high enrichment in protein content which can be up to 40% (Hort Purdue, 2006). This by-product of Canola is considered being among the best protein plants regarding its nutritional value and therefore is very competitive to soy meal for fodder. It is recommended for cattle, pig and poultry consumption due to its low content in glucosinolates, causal agent for metabolic disorder in these animals. It is remarkable that this glucosinolates' content of canola meal is even lower than the respective one of soy meal fact which makes it better than the later for monogastric diets. It has been predicted that canola varieties in the foreseeable future will provide a meal almost free from glucosinolates which will enable its use without any limitations. Besides, Canola can be used as well as annual forage for poultry since it possesses higher protein content compared to the foliage of winter wheat (Oplinger et al., 1989). Moreover, the high quality of canola meal enables its use in almost all animal foddors (Hort Purdue, 2006).

Rapeseed-canola production

Regarding the expansion of rapeseed-canola crops around the world it is cited a big increase of their production in the years of World War II in Europe, U. S. A. and Canada, mainly for fuel consumption (SIU, 2006). Now days, the worldwide production of rapeseed including canola, has reached 38 millions tonnes annually. The main producers are Canada, Europe and China. It is remarkable that China and Europe show a together production of 22 millions of tonnes annually (Asa-europe, 2006). Within the Europe-15, Germany and Poland were the two major producers of rapeseed-canola. However FAO predicted for the years 2004-2005 four European countries with the highest rapeseed production. These countries are; Germany with 5.277.000 t., France with 3.969.257 t., United Kingdom with 1.612.000 t. and Poland with 1.292.329 t., whereas the world production was predicted to reach around 46.255.000 t. (Wikipedia, 2006). Regarding the Europe-25 the expansion of rapeseed cultivation is attributed partly to the high prices of rapeseed oil, influenced by the rapid growth of European bio-diesel industry, and by the present uncertainty of food industries about how the European labelling regulations of GMO's will influence the market of vegetable oil. Based on these reasons it is predicted that the

EU-25 will reach a production of 17.74 millions tones of rapeseed (Asa-europe, 2006).

Costs of production

According to a research that took place in Minnesota and Wisconsin in U. S. A., for the comparison of soybean’s and canola’s cost production, it was revealed that there was not a big difference between them. For this comparison it was assumed that costs for equipment, time investment etc., the so-called “fixed-costs”, were the same for both crops.

Table 3. Production costs of soybean and canola.

Expenses	Cost/Acre in \$	
	Soybean	Canola
Fixed costs	152	152
Variable Costs		
Seed	15.0	14.0
Inoculumrn	0.5	0.0
Fertilizer	16.8	34.0
Herbicide	15.0	6.0
Insecticide	0.0	1.5
Subtotal	47.3	55.5
Total Cost	199.3	207.5

Source: Oplinger, 1998

From Table 3, it can be observed that even if the fixed-costs are the same for both crops, the total cost for the production of canola per acre is slightly higher that the one of soybeans. However considering the variability of uses and benefits of rapeseed and its potentials to evolve in future in a highly profitable crop, farmers should not be deterred from its cultivation. Besides, apart from the use of rapeseed in livestock section there is a high demand for its oil from the U. S. market which is continually increasing. After all, rapeseed and canola are recommended crops by

the European Commission as among the best alternatives of banned animal meal (Commission of the European communities, 2001).

Sunflower

Sunflower (*Helianthus annuus*) is an annual plant that belongs to the family of Compositae. The general characteristic of this plant is the big flower head, consisting of other smaller flowers, which has the ability to follow the direction of the sun. Sunflower originated in South America and was brought to Europe through Spain and later on was spread to Russia where it was easily adapted (Putnam et al., 1990). The favourable growing conditions for this plant are the ones in subtropical and temperate zones but after the occurrence of selective breeding it can easily be found in many semi-arid areas around the world. Therefore sunflower can grow in highly variable countries around the world like North and South America, central Africa and Soviet Union. It is tolerant in both high and low temperatures and easily adaptable in a wide range of soil types from sandy to clays. Although it is not very tolerant to soil salinity it gives better results compared to soybeans on this respect (Murphy 1994).

Uses of Sunflower

Over the years of its cultivation, sunflower has been grown mainly for oil production. The average oil content of the sunflower seed is 40%-50% whereas of the kernel can reach up to 60% (Murphy 1994). The produced oil is coming from the seeds and due to its high level of unsaturated fatty acids, low content of linolenic acid and the light colour, is considered as high quality oil for human consumption. It is reported that can easily approach the quality of the olive oil and therefore is broadly used as a substitute (Putnam et al., 1990).

Moreover the seeds can be used as fodder for poultry in combination with other feeds due to their very high content of oil, whereas the residues of the oil can serve as an excellent feed for cattle consumption. The non or partly dehulled meal of sunflower has been shown to replace the soybean meal for ruminants as well as for poultry. Compared to soybean meal it contains equal protein content and higher fibre but provides lower energy content. Furthermore, sunflower is used as silage crop grown in combination with vegetables. The level of its nutritional quality is higher than corn and the crude protein content is similar to grass hay. Generally it is

recommended for cattle, oxen and low milk production (Putnam et al., 1990). Another by-product of sunflower is the seed cake which is used as feed for pigs. Finally sunflower can serve as a green manure to fields, can give a high quality of fuel and can be used for soap and paper making (Murphy, 1994).

Sunflower production

The production of sunflower now days, lies mainly in European countries and U. S. A. and partly in Russia and India. Within the Europe the main producer countries are Spain, France, Italy, Portugal and Germany (Murphy 1994). In the following table European countries that produce sunflower are listed and yields in t/ha are displayed for their between comparison.

Table 4. Display of the sunflower's production in 2001

Country	Area Harvested (ha)	Yield t/ha
Austria	20.33	2.49
France	707.26	2.29
Germany	24.91	2.48
Greece	17.46	1.31
Italy	207.82	2.05
Portugal	50.0	0.66
Spain	852.2	1.01
USA	1.033.98	1.5
World	18.015.86	1.16

Source: FAO, 2001

From the Table 4 it can be observed that although USA has harvested the biggest area in ha compared to the European countries in 2001, the yield that has obtained could not surpass the European one. European countries with the highest yield are Austria, Germany, France and Italy whereas the rest are coming after them (FAO, 2001).

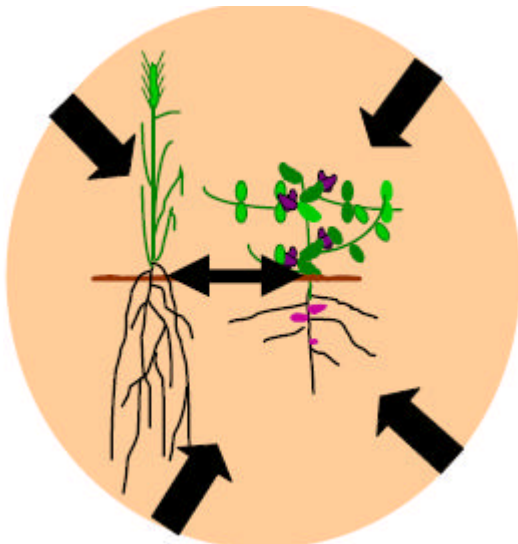
Although the costs for producing sunflower are quite high the prices in the market show a continually increase. According to Murphy (1994) it is predicted in the foreseeable future an inclination to make sunflower oil more competitive to palm and

soybean oil in the market. Therefore many researches are taking place in order to improve more the quality of the sunflower oil and many more are still expected.

4.2. Intercropping

Another alternative option is intercropping which means that more crops are grown at the same time (Hauggaard-Nielsen, 2006). For example the combination of “grass clover” and lucerne with grain are well known combinations. A descriptive scheme is the one shown in figure 12. There already have been studies with intercropping between grain legumes and cereal which have been very positive. The potential benefits and problems are listed underneath.

Figure 12: Principles of intercropping



Source: Hauggaard-Nielsen, 2006.

Potential benefits

Intercropping has benefits for the yields. They are greater and more stable. They make better use of resources, reduce weed, pest and diseases, increase protein content of cereal, reduce N leaching in autumn compared to grain legume sole cropping and increase biodiversity (Hauggaard-Nielsen, 2006).

Potential problems

Intercropping may have problems during the harvest. The components may have different optimal maturity stages. In some situations it is different to predict the outcome of competition, in some situations it gives reduced total N₂-fixation and in

general the market is not yet ready to receive mixed grains (Hauggaard-Nielsen, 2006).

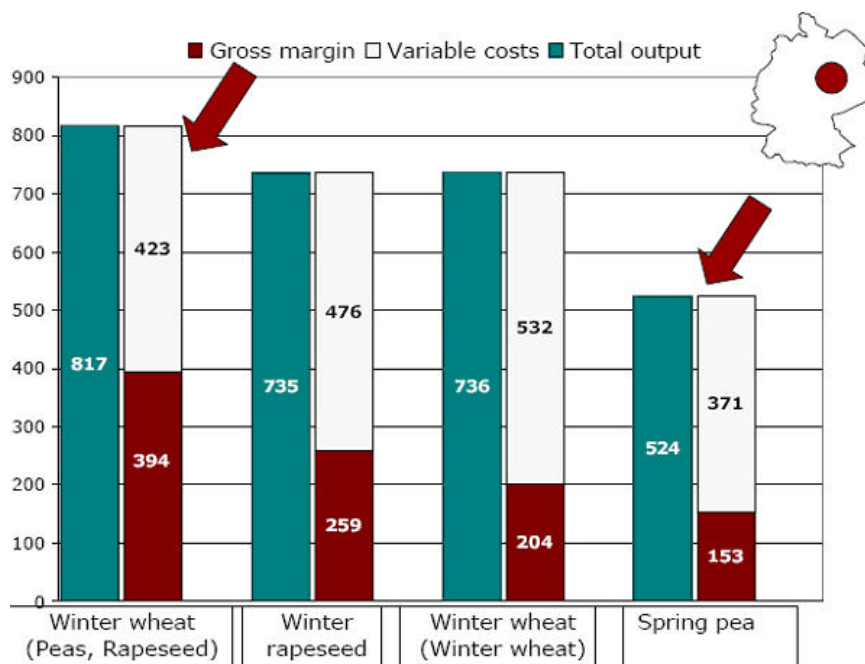
4.3. Future

Currently there is a lot of development going on in genetic improvement of crops. Therefore in the future alternative crops might be even better in protein content and therefore more feasible as an alternative for soy beans. However these improved crops aren't yet available and will not be further discussed in this research but it should be considered when thinking about alternatives, in the future alternatives will be more competitive.

4.4. Economic feasibility

To address the economic feasibility of the alternative crops data of Grain Legumes pro will be used. The data they have gathered is for eastern Germany and gives an example of the difference between conventional wheat and alternative crops at revenues and cost level. In figure 13 is shown the revenues for different types of crops. Winter wheat (peas, rapeseed) gives the highest (394) gross margin whereas peas give the lowest (153) gross margin (Richthofen, 2006).

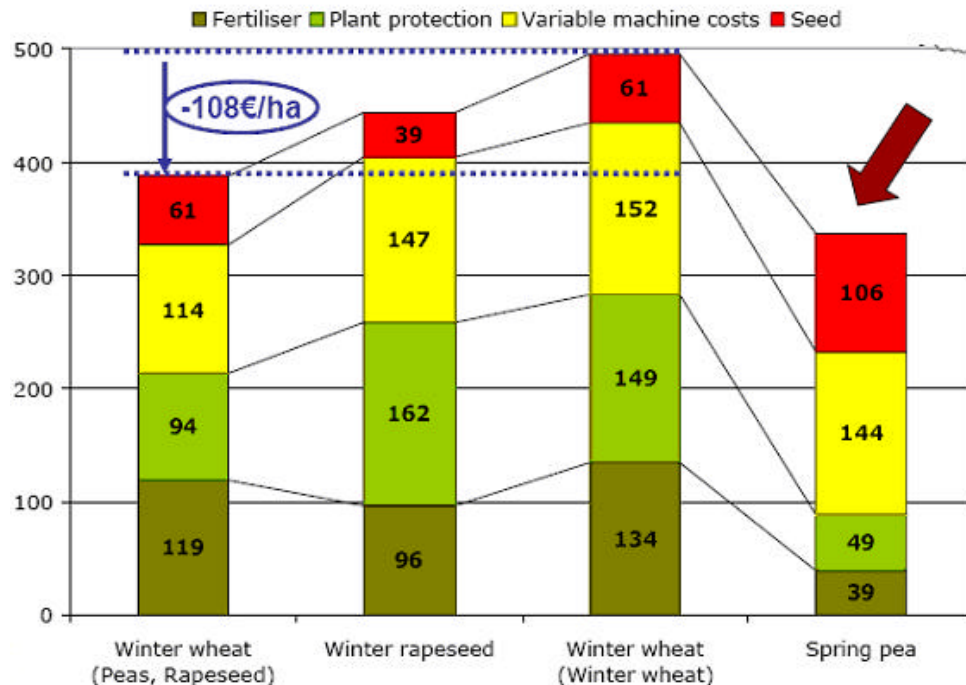
Figure 13: Economic interest at crop level in eastern Germany



Source: Richthofen, 2006

As it can be seen in figure 14 the production cost of peas is the lowest whereas winter wheat has the highest production costs.

Figure 14: major production costs in eastern Germany



Source: Richthofen, 2006.

The direct revenues for growing grain legumes are lower than for growing conventional crops however grain legumes have also rotational advantages. They are beneficial for the yield of the following cereal crop, reduce the N fertilizer requirement, reduce the input of chemicals and risk of resistance and improve the soil structure and facilitation of minimum tillage for the following crop. All this may lead to a reduction of cost of 90-215 euro according to a GL-pro study in France (Richthofen, 2006).

4.5. Farmers' opinions

Why are farmers not growing grain legumes? In a survey on 600 farmers who didn't grow or stopped growing legumes out of Belgium, France, Germany and Spain they quoted what handicaps there are in their eyes. The crops are lacking competitiveness in their eyes; the yield is low, low market prices and high seed costs. Also they stated higher risks in the form of fluctuating yields and harvesting

problems. These farmers make their cultivation choices by gross margins on their crops (Richthofen, 2006).

4.6. Conclusions

Regarding the farm level the revenues of growing alternative crops are lower than when conventional crops are grown. Farmers don't seem willing to adapt to alternatives because of the lack of competitiveness, higher risks and gross margins on their crops. This is however a short term view because they don't think about rotation of the crops and that not all things can be measured in gross margin of a specific year. Alternative crops are beneficial for rotation of the crops and reduce production cost. It is important that there will be a market created for the alternative crops. If there isn't a good working market it will not be feasible to choose for alternative crops because they can't be sold properly.

Furthermore oilseed crops are shown to be very promising cultivations for the European farmers despite their high production cost. As it has already been mentioned; the Blair House Agreement has placed a limit on the quantity of the European oilseed production regarding its use for human consumption and industrial use. However Europe is supporting and promoting these crops because they have a very high nutritional value and can compete with soy meal since they possess high protein content. After all Europe has the potential to increase the oilseed production due to its suitable climatic conditions. Farmers could take advantage of the continual increasing demand for sunflower oil and canola meal on the world market. This might be an attractive opportunity to introduce profitable promising crops in their fields.

5. Final Conclusions

The CAP in EU failed with the objectives of maintaining the number of farmers and increasing the arable farmer's income in the Netherlands; a change has to be done to fulfil these objectives.

The current policy is not sustainable, and the direct payments are just short a term solution for the farmer's income. Moreover, there are no clear alternative policies that will not affect other economical sectors in EU. This is not a good reason for not changing the CAP, an alternative policy to benefit most of people will depend on the capacity of the government to negotiate further agreements at national and international level (managed trade). The designing of new CAP does not have to be strictly based on general economical terms and it has to involve and take into account the participation of different stakeholders. Also it has to take into account a countries responsibility for sustainable agricultural production. It would help to assume the design of an agricultural policy change according to the local reality of EU society.

The suggestions mentioned in the part of the experts were to give subsidies only for structural disadvantages. According to them it would make the competition in the agriculture a little bit fairer, since farmers with disadvantages in the production could compete with others. However, the government have to provide the framework and within this framework the different stakeholders have to interact in free way.

In this research it became clear that there are suitable alternative crops which also contain a high amount of protein. This makes the implementation of new crops easier. Although, first there should be a market for these crops; farmers will not start growing these alternative crops when they can't sell it anywhere. A decent market has to be set up first. Without that situation it will not be possible to create high volumes of these alternative crops to meet the demand of protein requested by livestock farmers.



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Schoenberger, H. 2006: The first expert interviewed is Dr. H. Schoenberger, Consultant for agricultural crops with ca. 1700 farms all over Europe and an acreage of 1.000.000 ha. The sizes of the farms are between 5 and 6.500 ha.