Tillage Sector Development Plan 2012

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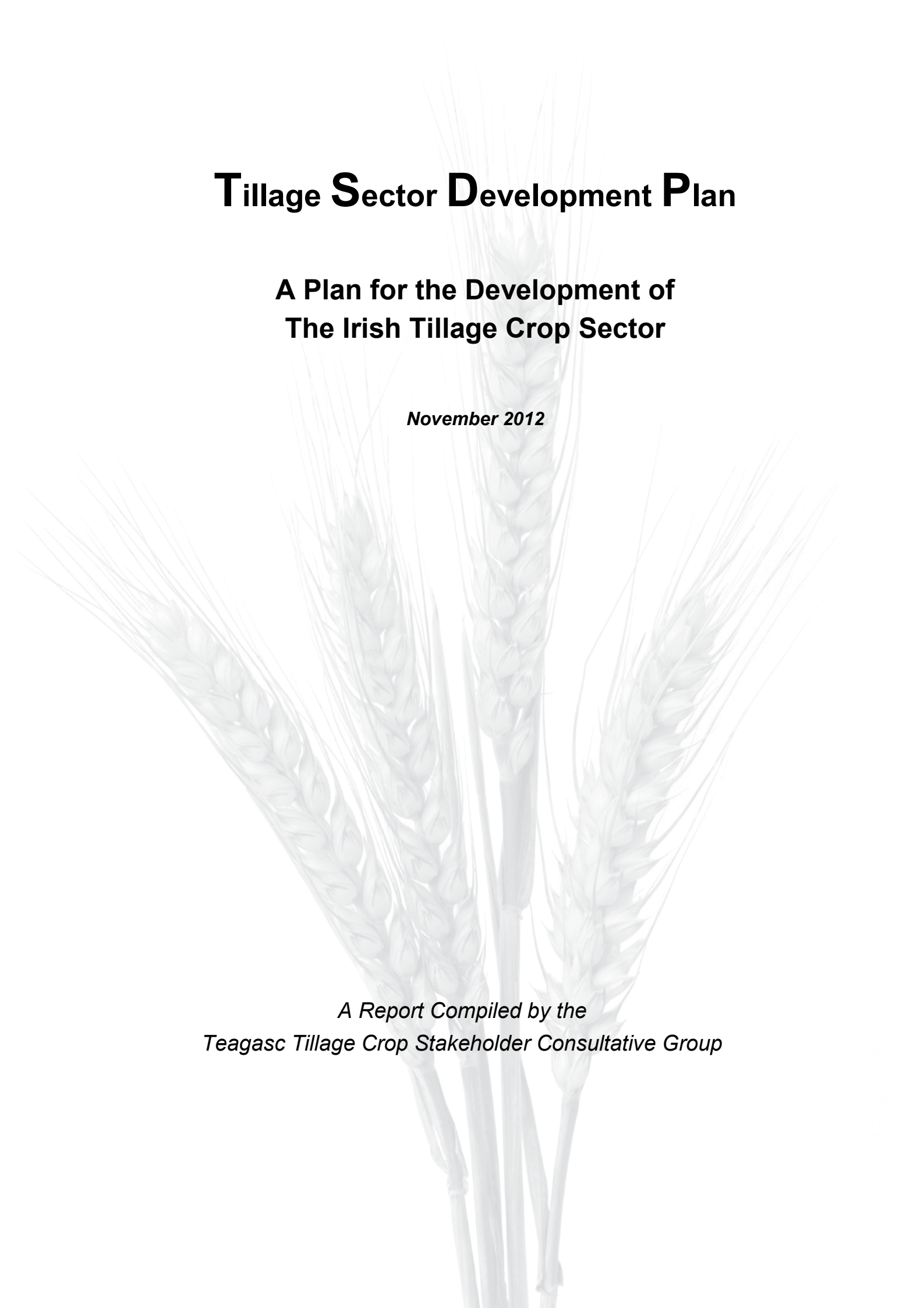
A Plan for the Development of The Irish Tillage Crop Sector

November 2012



A Report Compiled by the
Teagasc Tillage Crop Stakeholder Consultative Group

Contents

Foreword

This report has been compiled by a wide group that is broadly representative of Ireland's tillage sector. The initiative to produce this plan was spearheaded by the external representatives on the Teagasc Tillage Stakeholder Consultative Group. However, the group canvassed the views of key players in Ireland's tillage industry and these views are reflected in this Plan. The broadly-based group that compiled this report wish to acknowledge the support provided by Teagasc experts in producing this Plan but also wish to state that the views expressed are those of the industry representatives.

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Chairman, Tillage Stakeholders Group

Industry Stakeholder Representatives

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Executive Summary

Introduction

The Teagasc Tillage Crops Stakeholder Group has, in consultation with the industry, drawn up the following development plan for the Irish tillage crops sector.

The purpose of this report is to identify profitable opportunities for increased markets that exist for the tillage sector. The opportunities identified evolved from close examination of existing markets and discussion with end users as to where they see their markets developing and where they would like to source raw material. For obvious commercial reasons the details of individual companies plans have not been disclosed. This report was considered a necessary follow-on to the Food Harvest 2020 (FH2020) Report where specific targets for the tillage crops sector were not included. Whilst significant opportunities for growth have been identified for a significant number of individual crops, it is important to note that the opportunities are not interdependent and therefore, it is not appropriate to sum the individual potential growth areas. As described in the plan, the degree to which any is fully exploited will depend on a number of factors including; external market movements, land availability, and competition from other enterprises. Given these uncertainties it is unlikely that all of the individual crop opportunities will be attained. The purpose of the plan is to identify opportunities and stimulate concerted action by the sector in order to exploit the potential that exists to the maximum.

The Teagasc Tillage Crops Stakeholder Group was established to advise Teagasc on their research and knowledge transfer programmes and is representative of a wide range of stakeholders. However, in order for this plan to represent the entire sector, the views of a much wider group of stakeholders were sought and taken on board in finalising the plan.

Overview of the Sector

The cropped area in Ireland extends to 378,000 ha or 9% of the area farmed. Crop production (including horticulture) contributes €700 million to agricultural output in addition to €150 million Single Farm Payment. There are 11,000 growers with a further 15,000 employed in the food processing sector dependent on tillage crops. Annual combinable crop production amounts to 2.3 million tonnes while a further 3 million tonnes of animal feed ingredients are imported. Irish cereal yields are the highest in the world and, despite recent stagnation, have the potential to increase by 1% per annum.

World and European grain production and stocks are expected to decrease in the current year. The medium term prospects are for EU cereal prices to remain above long term averages but with ever greater volatility.

At farm level, the average family farm income for tillage farmers was €35,800 in 2011 compared with an overall average of €25,000. The income per labour unit was relatively very high on tillage farms at €48,000.

Potential for Future Development

The plan identifies considerable potential for expansion in cereals, oilseed rape and some potential in potatoes. Expansion in cereals, oilseed rape and potatoes will depend on land availability and relative profitability with competing crops and enterprises. There is also potential for expansion in energy crops, but in addition this will also depend on an integrated cross departmental range of incentives. The revival of the sugar beet industry is contingent on the abolition of EU sugar quotas and/or a derogation for Ireland, and the price of sugar.

If all the potential increases in the various crops were achieved, the area under crops could increase by 221,730 ha or some 64% and the production of combinable crops would increase

by 1.14 million tonnes. However, the final outcome will depend on external market movements, land availability and competition from other enterprises. The plan stresses the importance of maximising the potential so as to reduce our reliance on imported foodstuffs, to underpin the achievement of the targets for the livestock sectors in FH2020 and to enhance the Brand Ireland image and the Origin Green Ireland campaign.

If the potential expansion were to be achieved, there would be a cumulative potential to increase the output of the sector by €541 million and to create 2,000 to 3,000 new jobs.

Actions Needed to Achieve the Potential

The achievement of these ambitious targets will require sustained and co-ordinated action from the entire industry including farmers, input suppliers, buyers, processors, researchers and advisers as well as policy makers. The plan outlines in Chapter 2 a range of actions and policy/legislative changes deemed necessary in order to exploit the potential to the maximum.

Chapter 1: Findings and Conclusions

1.1 Introduction

This chapter provides an overview of the tillage sector in Ireland and goes on to summarise the market prospects as detailed in Chapter 3. The detailed crop by crop analyses contained in Chapter 4 are then summarised, followed by a look at the potential for growth for the sector as a whole. This is followed by an analysis of the potential for increased output value in monetary terms and for the creation of new jobs.

1.2 Overview of the Tillage Sector

By the middle of the century the global population is predicted to rise to nine billion. In conjunction with this, diets in developing countries are changing to include a greater proportion of animal protein. It is now recognised globally that these two factors together are likely to result in a doubling in demand for arable commodities in the next 40 years. It is also widely recognised that agriculture as it is currently practiced will struggle to increase supply to meet this demand resulting in steadily increasing commodity prices. Whilst prices will rise, the absence of market controls, as previously operated in Europe, will mean that this general trend in rising prices will be accompanied by greater seasonal price volatility as supply and demand fluctuates from year to year.

Tillage crop production in Ireland has traditionally been largely based around the provision of feedstuffs to the livestock sector and feedstock to industries such as malting, milling, sugar, breakfast cereal, distilling, food etc., although in recent years we have lost our sugar industry. Despite the withdrawal of official support for transport biofuel production in Ireland, interest in oilseed rape production has increased, driven by high world prices and also the need for break crops for cereal production.

It is important to remember that cereals and non-cereal combinable crops can easily replace one another on farm depending on their potential margin and the availability of suitable production slots in the rotation. Whilst high prices for oilseed rape are encouraging production of this crop, the country is at the loss of most of its added-value potential because we lose both the oil and the resultant high protein cake once our crop is exported for crushing abroad. This means we import foreign oil, foreign protein and forfeit potential carbon benefits in the process.

The majority of our combinable crops provide grains for our livestock feed market. Because of this our industry has developed cheaper processing options for on-farm use of cereals, such as crimping and wholecrop, and the production of feed crops like triticale, forage maize, fodder beet, kale etc. for livestock feed.

There is considerable scope for increased production from tillage to replace much of the imported foodstuffs used for animal feed. These provide cost effective, home-grown traceable feed to help underpin expansion in our dairy and livestock sectors and to support the Brand Ireland image of food produced on our green island. We also provide good quality traceable raw material for malting, milling, distilling and breakfast feeds, oils etc.

This report suggests potential to increase combinable crop area by up to 37% from the 308,580 ha average during 2008-2011. Combinable crop production could rise from an average of 2.3 million tonnes during this period to 3.7 million tonnes by 2020. Should this level of expansion occur, it would displace the bulk of imported starch products and help enhance the Brand Ireland image. But such expansion would also increase the need for additional storage capacity at farm and/or merchant level to accommodate the different crops.

Much of our crop base is produced on the same land area year after year and may benefit from organic matter inclusion. This need can greatly support the recycling of organic manures and composts from the livestock and other sectors. This would help to reduce our

dependence on expensive artificial fertilizers and reduce the associated emissions whilst adding significantly to crop productivity and soil health.

However, the achievement of this potential for expansion will necessitate the removal of a number of obstacles. Access to land locally at affordable prices is key to establishing efficient production units. So is the provision of research and advice to help growers achieve the potential of their land and the yield levels indicated.

1.3 Size and Shape of Sector

The Irish arable sector is characterised as follows:

- Total cropped area amounts to 378,000 ha and accounts for 9% of the area farmed in Ireland.
- 51% of arable crops are grown on leased/rented land.
- Crop production (including horticulture) contributes €700 million to agricultural output at farm gate price in addition to €150 million Single Farm Payment.
- Approximately 30% of the 51,500 jobs in the food processing sector depend on tillage crops.
- Grower numbers have stabilized at 11,000 in recent years following rationalization from 100,000 in the mid 1970's.
- Annual combinable crop production varies significantly from year to year and averages 2.3 million tonnes per annum.
- Over 3 million tonnes of feed ingredients, including 1.5 million tonnes of proteins, are imported annually.
- Grain exports are very variable and amounted to 247,388 tonnes in 2011, mainly to Northern Ireland.
- Irish cereal yields are among the highest in the world and despite a recent stagnation have the potential to increase at close to 1% per annum.
- 23.4% of Irish agricultural soils are deemed very suitable for tillage crops while a further 11.7% are deemed moderately suitable (see map in Appendix 1).

1.4 Market Prospects

Extreme world cereal price volatility has been witnessed over the past 5 years due to low world stocks, the rise in global cereal consumption and biofuel production. This volatility is expected to continue into the medium term, hence uncertainty about the production response and price stability is expected to stay with us for some time.

The latest data available from the International Grains Council forecast that total world grain production will fall by 4.0%, to 1,776 million tonnes in the year 2012/13. Global carry over stocks for all grains are expected to fall by 33 million tonnes by the end of 2012/13 with consequential implications for food security. Within the European Union, the latest Strategie Grains estimates for the 2012 harvest show the total area under cereals at 59 million ha and forecasts total production of 270.5 million tonnes, representing a 5.0% decrease on the 2011 harvest.

Green prices for feed grain in Ireland were at €150-€160 per tonne at harvest 2011, but in line with world and EU prices which have moved upwards significantly due to international production forecasts, prices have increased considerably and are currently in the order of €200 - €210 per tonne.

The "Prospects for agricultural markets and income in the EU 2011-2020" published in December 2011 project that the medium-term prospects for EU cereal markets will be characterised by tight market conditions, low stock levels and prices remaining above long term averages. However, greater fluctuations in future cereal prices are also expected

compared with the past. These developments are driven by moderate supply growth reaching 305 million tonnes by 2020, mainly the result of low yield growth rates (0.5% per year on average), and an increase in the domestic use of cereals in the EU, most notably due to growing demand by the ethanol and biofuels industry in the framework of the 2008 Renewable Energy Directive (RED).

At farm level, the 2011 National Farm Survey ([1]Hennessy *et al*., 2012) indicated that the average family farm income for mainly tillage farms was €35,800 compared with an average family farm income for all farms of €25,000. In addition, while income per labour unit is still highest on the specialist dairy system, the specialist tillage system follows closely in second position at €48,000 per labour unit.

1.5 Potential for Future Development

In this section, the projections up to 2020 for nine major crop categories are summarised (see Chapter 4 for a more in-depth analysis). This is followed by an analysis of the prospects for the overall tillage sector. As crop yields and areas sown can be quite volatile from year to year, the base-line figures for area and output are based on the four year average from 2008 to 2011. The individual crop projections in 2020 are based on the potential for that crop under favourable conditions while the overall sectoral projections, while ambitious, are tempered somewhat by overall limitations such as land availability and other enterprise profitability.

1.5.1 Barley

There is potential to increase the area under barley by 39,660 ha to 223,660 ha with output expected to increase by 466,800 tonnes to 1,755,500 tonnes.

Barley is the largest cereal crop in Ireland. The total area of this crop fell for many decades but this has levelled off and increased somewhat in recent years. In the past four years we grew an average of 184,000 ha of barley to produce nearly 1.3 million tonnes through a combination of winter and spring varieties. The winter crop is increasing in popularity in recent years as a result of improved varieties and very high yield potential from six-row types. This is increasing the overall yield and total barley production.

Barley is primarily used for feed production with a significant proportion of the area (23,500 ha) used for malting and roasting. Demand for feed is likely to increase given the plans for increased production in the livestock sector in FH2020. Demand for malting barley is also likely to increase with planned expansion by the Malsters and increasing demand for barley and malt for distilling at home and abroad. This will require increased focus on achieving the necessary quality standards.

The principal constraint to the potential expansion in area is the availability and cost of land and the competition for land between crop and animal enterprises. The greening measures in CAP Reform may also force rotation thereby precluding the growing of continuous barley.

1.5.2 Wheat

There is potential to increase the area under wheat by 14,000 ha to 105,800 ha with output expected to increase by 289,000 tonnes to 1,109,400 tonnes.

Wheat production has been somewhat erratic in recent years due to a combination of area planted and yield. The main area constraint relates to winter wheat planting which is often constrained by wet weather.

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[1]*Hennessy T., Kinsella A., Moran B., and Quinlan G. (2012) National Farm Survey 2011. Agricultural and Farm Survey Department, Teagasc*

Wheat has two main market outlets – feed and milling. The feed wheat market provides wheat for use in feed and for export. Overall demand can be expected to increase in the face of increasing livestock production and there is potential to displace some or all of the wheat and corn imports in feed rations.

Winter wheat is the main part of the crop and accounts for about 75% of total production. Despite high yields, the competitiveness of winter wheat is reduced by high production cost which can be compounded by relatively low yield in some years. Average yield is adversely affected by the proportion of second and continuous wheat in the total acreage. As we move forward a much higher proportion of the total wheat acreage is likely to be first wheat thus improving the average yield.

While there is a market for up to 50,000 tonnes of milling wheat per annum, the generally high yield potential of wheat means protein levels are hard to reach. In addition, bad harvests can result in the total rejection of the Irish crop due to a combination of low Hagberg falling numbers and inadequate specific weights.

Wheat is a high-cost crop and one of the principal constraints to maintaining or increasing wheat acreage is its vulnerability to increasing input costs such as fertiliser, fuel, crop protection products, machinery and land. Fungicide resistance and the threatened loss of at least a number of the triazole fungicides also pose a considerable threat.

1.5.3 Oats

There is potential to increase the area under oats by 13,760 ha to 34,860 ha with output expected to increase by 87,900 tonnes to 246,320 tonnes.

Oats is a very traditional Irish crop grown historically to fuel the working horses of Ireland but now mainly to feed people and sport horses. The current market for oats is about 140,000t and this is used for feed, milling, seed and export. The feed market is split into the high quality product which is sold at a premium and the basic feed market for sheep and other ruminants which is sold at a discount price.

With all markets performing well and successful exports of horse feed being developed, the future looks bright for Irish oats, especially as production is contracting in the US and Canada, both potentially big markets for Irish oats. As a result we see the total demand for oats increasing by at least 50% over the next eight years. These are quality markets and the industry needs adequate storage facilities to store all of the crop in food grade facilities. Cleaning and screening facilities are also required to ensure that the crop meets the trading specification every year.

In terms of constraints to expansion, there has been over-reliance on the variety Barra for the high quality market. In tandem with this there has been little genetic improvement in terms of disease resistance, standing power and yield.

1.5.4 Pulses

There is potential to increase the area under pulses from 3,560 ha to 10,300 ha with output expected to increase by 46,000 tonnes to 64,700 tonnes.

Production of pulses in this country has been traditionally low. The two main crops of importance are field beans and combining peas. For tillage farming, pulses bring a rotational benefit through nitrogen fixing and soil conditioning, thus benefiting the performance of the following crop and decreasing the amount of nitrogen required to grow it.

While we are small producers of pulses we have a very big requirement for protein sources to supplement our native grains for our livestock sector, which imports over 1.3 million tonnes of protein feeds annually.

If demand for feed is increased by the implementation of the FH2020 targets then more protein will be required. So while there is no issue on the demand side, the majority of constraints are on the production and processing side. The current high world prices for protein may increase the attractiveness of pulses as higher prices would compensate for the variability in their performance.

The current small scale of pulse crops has resulted in a reluctance to promote the crop due to a lack of the necessary infrastructure and low investment in research and development.

1.5.5 Oilseed Rape

There is potential to significantly increase the area under oilseed rape from 8,100 ha to 59,900 ha with output increasing from 32,300 tonnes to 287,300 tonnes.

The area sown to oilseed rape remained low for many years due to the lack of price related profitability of the crop. This has changed in recent years and we are already in a significant expansion phase with acreage having increased from 2,300 ha in 2003 to 17,000 ha in 2012 and set for rapid expansion in the years ahead based on price and rotational advantages. To fully exploit the crop's potential, a market must be opened up for oilseed rape oil so that this crop can be crushed and utilized in this country leaving the protein feed in situ for use in our expanding livestock sector.

With demand for vegetable oils now being driven by obligatory biofuel inclusion rates, it would be opportune to encourage home crushing either for the food or fuel markets. With access to non-GM protein sources likely to become increasingly limited, this is an asset that should not be exported. However, with or without home crushing, it seems likely that the crop will continue to expand in area leaving exports as the likely market if a viable use for the oil is not found.

There is increasing interest in the use of oilseed rape oil as a food ingredient for cooking, salads etc. Expansion in this area looks likely to continue with potential for exports of the processed oil.

As with pulses, the current small scale of oilseed rape has resulted in a shortfall in terms of the necessary infrastructure and a lack of investment in research and development. As the area increases, there is likely to be increased disease pressure resulting in lower yields.

1.5.6 Energy Crops

There is potential to significantly increase the area under energy crops from 4,486 ha to 66,800 ha with output increasing from 36,000 tonnes to 628,000 tonnes.

Ireland has been slow to embrace bioenergy crops as a potential renewable energy resource. There are around 4,500 ha of energy crops planted in Ireland, mainly through the 'Bioenergy Scheme', but much of this is currently without a market as a result of several proposed projects failing to get planning permission, grid connection or financial backing. Nevertheless, the Government is committed to producing 16% of our total energy from renewables by 2020. The most challenging part of this target is achieving the 12% renewable heat target.

Energy crops can produce a high output from a relatively small area. By using energy crops, it is possible to meet over 50% of the renewable heat target from just

2% of the agricultural grassland (66,800 ha). This is based on an average yield of 9.4 dry tonnes per ha per year and assumes best practice on good agricultural land.

This could boost the Irish economy by saving Irish consumers €100 million per year on their heating costs and would deliver approximately €957 million of investment in biomass boiler projects. This would help Ireland generate 532 new jobs in the biomass sector.

One of the main constraints to achieving this potential has been the failure to develop a proper marketing structure and the associated infrastructure. Farmers are also concerned regarding the long term nature of these crops and the relatively poor cash flow in the early years.

1.5.7 Potatoes

There is limited potential to increase the current 2012 area under potatoes by 1,470 ha while output is projected to increase by 67,000 tonnes to 482,000 tonnes.

In 2012, 8,722 ha of potatoes were grown by some 700 growers, of which Meath, Dublin, Louth and Wexford accounted for 62% of the production area planted. Yields have remained relatively static over the past 9 years at 38 tonnes/ha. However, highs and lows around this average of 45 tonnes/ha and 32 tonnes/ha respectively were recorded in individual years.

The total potato production output normally ranges from 350,000-430,000 tonnes per annum. Early potato production accounts for 9%, main crop 87.5% and seed production 3.5%.

There is potential for diversification of current potato output from mainly ware/processing to increased production of seed potatoes for export, salad potatoes for increasing domestic market and chipping for local markets, thereby increasing the total value of potato production in Ireland by €2.8 - €4.1 million per year.

Reorganising the supply chain to closely match production and market supply would reduce market volatility.

This market volatility, combined with high costs of production, potential for cheap imports and low margins, represents the main threat to the potato sector. There is also an over-reliance on Rooster as well as the practice by retailers to use potatoes as a loss leader.

1.5.8 Beet

Sugar beet production ceased in Ireland in 2006 when production stood at 1.2 million tonnes of sugar beet produced from 35,000 ha. Fodder beet acreage of 8,000 ha has remained relatively stable since 2006. Most of this production is used as animal feed with the majority used on the producers farm and approximately 25% available for sale.

For any re-establishment of sugar beet growing, either EU sugar quotas must be abolished or Ireland must be given the rights to produce at least 150,000 tonnes of sugar per annum. Investor and grower interest is high in establishing a sugar beet industry based on bio-ethanol production, but a suitable processing facility must be developed. Should the re-establishment of the industry be successful there is potential to increase the area under beet from 8,000 ha to 30,000 ha with output increasing from 480,000 tonnes to 1,800,000 tonnes.

The potential for fodder beet growth is limited due to transport costs and machinery limitations at consumer level.

Obviously the main constraint to achieving this potential relates to the abolition of sugar quotas. The high cost base of the crop and future sugar prices will also determine the feasibility of sugar production in this country as will the willingness of growers to invest in a new processing facility.

1.5.9: Maize

There is potential to increase the area under maize by 10,000 ha to 30,875 ha with output expected to increase by 150,000 tonnes of dry matter.

Maize is grown almost entirely for whole crop silage production, and can produce a high value high energy feed. Increasingly, maize has been grown under plastic mulches to extend the growing season and hence productivity. Because there is only one harvest a year at a different time to other harvests, and as it has a greater transport density than grass, maize can offer a less costly option for fodder production on outlying land than grass. The 'skill level' required to produce commercially worthwhile crops on favourable sites is more within the competence zone of grassland farmers than for whole-crop small grain cereals.

The principal constraint to a recovery in the area under maize is the significant seasonal variability which can only be addressed through improved varieties. Maize is also vulnerable to increasing input costs such as fertilizer, fuel, chemicals etc. Greening in CAP reform may also force rotation and decrease maize area.

1.6 Overall Sector

Table 1.1 below summarises the baseline (2008/11) area and output for each of the nine major crop categories, as well as projected area and output in 2020.

Table 1.1 : Crop Yield and Area Potential 2008/11-2020

Crop	2008/11 Tonnes	2020 Tonnes	2008/11 Ha	2020 Ha	2020 Increase Ha
Barley	1,288,900	1,755,500	184,000	223,660	**39,660**
Wheat	820,400	1,109,400	91,800	105,800	**14,000**
Oats	158,420	246,320	21,100	34,860	**13,760**
Pulses	18,700	64,700	3,560	10,300	**6,740**
OSR	32,300	287,300	8,100	59,900	**51,800**
Energy	36,000	628,000	4,500	66,800	**62,300**
Potatoes	415,000	482,000	* 8,700	10,170	**1,470**
Beet	480,000	1,800,000	8,000	30,000	**22,000**
Maize	313,000	463,000	20,875	30,875	**10,000**

**** 2012 area***

As can be seen from these figures, the total tillage and energy crop area has the potential to increase from 329,712 ha to 551,442 ha, an increase of 221,730 ha or 64%. In reality, this is unlikely to happen and the increase in area should be considered in the context of each individual crop as the increase in area of any one crop will depend on how it compares competitively with other crops, as well as how it fits within the crop rotation. The degree to which an overall increase in tillage area is realised will ultimately depend on availability of land. This, in turn, will depend on the relative competitiveness of tillage crops (dependant partially on global commodity prices) compared to alternative land use enterprises. The total potential increase in the production of combinable crops amounts to 1.14 million tonnes.

It must be stressed, however, that all of these potential increases in production are exactly that – the potential. Ultimately the realisation of any of these potentials will require action across the value chain – growers, merchants, processors and end users, in conjunction with technical support from research and advisory activities, as well as, in some instances, political support either at a national or international level.

1.7 Potential Increases in Value and Job Creation

The potential increases in area and production outlined above will also result in significant increases in the value of output and also in terms of new job creation.

Table 1.2: Potential Increases in Value

Crop	Additional Value (million €)
Barley	87.13
Wheat	53.90
Oats	16.32
Pulses	9.74
Oilseed Rape	101.90
Energy Crops	179.00
Potatoes	17.28
Beet	48.00
Maize	28.5

In a paper produced for the Minister for Agriculture's FH2020 High Level Implementation Group, [2]Miller *et al*., (2012) find that there are 17 jobs associated with every million euro of domestic output in the cereal sector at farm level. This figure is on a par with the employment associated with milk and beef production at farm level. In the case of potato production the figure is somewhat lower at nine jobs for every million euro at farm level.

Such figures are described as employment intensities and represent the average number of jobs associated with €1 million of output in the sector. It would not be appropriate to assume that at the margin (i.e. additional output) an increase in output value of €1 million would be associated with a similar amount of jobs. In reality the marginal employment intensity would be lower.

[2]*Miller C. Matthews A. Donnellan T and O'Donoghue C. (2012) The Economic Impact of Food Harvest 2020 Targets. Paper prepared for the FH2020 High Level Implementation Group*.

Consequently, at farm level the job creation associated with increased tillage production is likely to be considerably less than would be suggested by the average employment intensities. Pressure to increase productivity at farm level will continue and given that production in the tillage sector tends to be capital rather than labour intensive, additional jobs within the farm gate would be limited.

Beyond the farm gate there is also job creation potential associated with a higher level of tillage production. This relates to the knock-on jobs in the wider economy that would arise as the extent of production in the tillage sector in Ireland increases. The farm sector has strong linkages with a range of food, beverage and animal feed producers. [2]Miller *et al.,* (2012) find that there are about 2 jobs associated with each €1 million increase in output value in the animal feed sector and the figure in the beverage sector is similar.

Feed grain consumption in Ireland could increase to meet the increased requirements of the livestock sectors. Ireland is a net importer of grain so increased domestic grain production could meet the increase in domestic consumption and even reduce the requirement to import grain for food and animal feed use.

Substituting domestically produced tillage crops for imported tillage crops will not in itself generate additional jobs in sectors which require the more traditional tillage crops as a raw material for processing. However, downstream jobs would certainly arise in the case of energy crop and beet production and the extent of the job creation associated with increased domestic production of barley, wheat and oats would depend on the extent to which value can be added to these raw materials through further processing.

Furthermore, any additional jobs which are created in downstream sectors will generate additional employment in the wider economy through the additional wages and salaries that are available to be spent in the economy. These jobs would be dispersed across a wide range of sectors throughout the economy, reflecting the pattern of spending by workers employed in these sectors.

It is not inconceivable that the increase in employment associated with the growth in the tillage sector set out in this report could amount to 2,000 to 3,000 jobs. This, along with a potential increase in value of €541million (Table 1.2) would represent a hugely significant increase which would justify a sustained and co-ordinated effort by all concerned to achieve these targets. It should also be pointed out that these potential increases in production would substitute for the current very large level of imports of animal feedstuffs thereby improving Ireland's balance of payments. This in turn would reduce our reliance on imported foodstuffs, would underpin the achievement of the ambitious targets for each of the livestock sectors as set out in the Food Harvest 2020 report and would enhance the Brand Ireland image and Origin Green Ireland campaign.

[2]*Miller C. Matthews A. Donnellan T and O'Donoghue C. (2012) The Economic Impact of Food Harvest 2020 Targets. Paper prepared for the FH2020 High Level Implementation Group*.

Chapter 2: Actions Needed to Achieve the Potential

There are a wide range of actions and policy/legislative changes outlined for each crop category in Chapter 4 which are deemed necessary in order to achieve the potential increases in area and output. The following is a summary of the principal action points and these actions will require further development during the implementation phase.

- The achievement of these ambitious targets will require sustained and co-ordinated action from the entire industry including farmers, input suppliers, buyers, processors, researchers and advisers, as well as policy makers.
- Intensive research is needed across the entire sector to remain competitive and to meet continuously evolving challenges. We must return to a target of a minimum of 1.0% per annum yield increase from the current Europe-wide yield plateau. Research to reduce production costs will be essential to cope with volatility and with our particular production structure, where scale remains a challenge. Particular threats to our production system such as evolving disease pathogens and reduced disease control options must be addressed. Every effort must be made to refocus EU research funding on sustainable intensification. Research deficits in minor crops must be addressed. Post harvest technologies from crop processing to food product development need to be developed to maximise value and market opportunities.
- Knowledge transfer strategies need to be continually developed to reflect the increasing complexity of the research information available to the industry. While existing models will continue, alternative models including combinations of group methods, ICT-aided decision support, web-based resources and more effective use of industry advisors, will need to be considered and developed. The DEP and BTAP models should also be considered for the tillage sector. A strong emphasis on financial performance will be required.
- As Plant Protection Products play a vital role in achieving top yields and quality in crop production in Ireland, we must ensure that future legislation in this area is not over restrictive.
- The reform of the CAP must not compromise the cropping sector. The Single Farm Payment (SFP) is essential to counteract the extreme volatility in grain markets. Maintenance of the current level of SFP is essential to maintain our family farm structure, which is vital for the viability of tillage farming. Access to land is crucial for the cropping sector and must not be compromised. The biggest threat emerges from the "Retention of Permanent Pasture" provision limiting the capability to plough areas currently in grassland for more than 5 years. This could severely impact on the possibility of increasing tillage area and impact on the operations of mixed farmers operating grassland-tillage rotations. The Permanent Pasture rules should operate at Member State level and not at individual farm level as is currently the case. The diverse nature of our farming landscape, with it's 'patchwork' of tillage and predominantly grassland, is a significant advantage in maintaining biodiversity.

  The "Crop Diversification" measure could pose difficulties for a significant number of farmers and lead to loss of overall yield capacity or the potential exit of some farmers from the sector. Each species such as wheat, oats, barley etc, and different cultures such as winter and spring growing of the different species, must be regarded as separate crops.

  The Ecological Focus Areas measure (under the new CAP) proposed at 7% of cropping area is unduly high for Ireland given our small tillage area relative to grassland and the fragmented nature of our fields with physical field boundaries.

  The increase in tillage area will bring useful environmental, biological and visual diversity to our predominantly grassland countryside. The environmental benefits of our small cropping area must be recognised in any greening of the CAP.

- There is a need to develop more specific crop and soil-type based fertiliser recommendations to be incorporated into future nitrates action plans, so that productivity can be optimised whilst reducing the risk of nutrients escaping to water.
- Frameworks need to be developed to facilitate the use of organic manures/municipal sludges on arable crops so as to reduce costs, encourage soil biological activity, improve soil fertility and increase crop productivity, while also providing a sustainable outlet for these products. These frameworks should include recommendations for the appropriate application of various types of sludges, manures and digestates on a range of crops in such a way as to alleviate food safety/marketing concerns. They should also include partnership agreements between tillage farmers and intensive pig/poultry/livestock producers.
- Access to land at reasonable cost is a major inhibiting factor for tillage farmers. Currently where growers attempt to expand, economy of scale benefits are usually eroded by land costs. Every effort must be made to secure the economy of scale benefits needed to be competitive by supporting share farming, collaborative partnerships, leasing arrangements and other novel scale mechanisms.
- The role of appropriate risk management strategies such as production insurance and price risk management tools to offset production and marketing volatility should be considered by growers.
- The use of native feed ingredients would underpin a more stable feed supply and would enhance the achievement of the FH2020 targets. This, in turn, would enhance the Brand Ireland image and Bord Bia's Origin Green Ireland campaign.
- Any significant increase in crop production will require a significant investment in storage, handling and drying facilities, both at producer level and at merchant/processor level.
- Steps must be taken to enable crushing of oilseed rape oil on this island to ensure that valuable oilseed rape meal is retained for the feed market. Access to the biofuel market would secure domestic demand, perhaps through a captive fleet utilization policy, for up to 84,000 tonnes of pure plant oil.
- There is a need for active promotion of regional niche and export opportunities for our crops/ crop products (e.g. Oats and Rapeseed oil). There is also a need for investment in processing facilities to upgrade the harvested product to the trading specifications.
- The re-establishment of the sugar beet industry will require the abolition of sugar quotas. If this is not achieved then a position to secure a derogation, which would allow Ireland to produce 150,000 - 200,000 tonnes of sugar, will be required. In addition, significant capital investment would be needed to erect processing facilities.
- The commitment to displace 10% of transport fossil fuel with renewable sources by 2020 must be maintained. The current obligation for biofuels is 4% with a plan to progressively increase this to 10%.
- There is need for a carefully considered, cross departmental support structure incorporating producers, processors and end users, in conjunction with the mainstream agri-sector, to foster the development of the energy crop sector.
- Delayed EU clearance for the importation and utilisation of new GM varieties grown overseas, while potentially problematic for the supply of concentrate rations to the livestock sectors, may present opportunities for tillage farmers in the shorter term. In the longer term, the benefits of new GM technologies such as disease resistance in potatoes and cereals should be exploited if acceptable to the consumer.

Chapter 3: Overview of Tillage Sector

3.1 Introduction

This Development Plan has been developed against a background of profound change in the current profitability of the crops sector brought about by world grain market changes. Extreme world cereal price volatility has been witnessed over the past 5 years due to low world stocks, the rise in global cereal consumption and biofuel production. This volatility is expected to continue into the medium term future, but with a general upward trend, hence uncertainty about the production response and price stability is expected to stay with us for some time.

The potato sector also faces continued change as consumption declines and marketing changes force further rationalization.

The objective of this document is to present an overview of the market and the challenges and opportunities facing the industry. Hence, this document should facilitate the creation of a future strategy for the sector by ensuring a renewed focus on efficient production to allow the industry produce competitively against a background of increased cereal demand, reduced potato demand, price volatility and environment-based production constraints.

3.2 Ireland's Arable Sector

The Irish arable sector is characterised as follows:

- Tillage crops account for approximately 9% of the area farmed in Ireland.
- Crop production (including horticulture) contributed €700 million to agricultural output at farm gate prices in 2011 (11% of total goods output) of which potato production was valued at €74 million at farm gate prices.
- There were approximately 11,000 cereal farmers in the country in 2010, down from approximately 14,500 cereal farmers in 2000 and approximately 100,000 in the mid 1970's.
- Out of 350 commercial potato growers, 100 growers produce 70% of the total 400,000 tonnes.
- Approximately 65-70% of the potato crop is marketed through packers and merchants with centralized supply points delivering on to retail multiples.
- Annual cereal output is about 2.3 million tonnes (average 2009-2011). Today this output is produced from approximately 300,000 ha compared to approximately 450,000 ha in the early 1980's.
- Approximately 700,000 tonnes of wheat are imported annually (average 2009 – 2011) and 200,000 tonnes are exported, mainly to Northern Ireland (average 2009-2011).
- Irish cereal yields are amongst the highest in the world.
- The area of pulses (peas and beans) dropped from an average of 4,500 ha in the 1990's to about 1,500 ha in 2000. However, it has recovered to close to 4,000 ha in the last three years (average 2009-2011).
- The oilseed rape area dropped by half from an average of approximately 5,000 ha grown in the 1990's to 2,500 ha in the early 2000's. However, this area has recovered in recent years and averaged 9,000 ha in the past three years (2009-2011), with a peak area of 17,000 ha in 2012.
- Maize peaked at 24,000 ha but is now at 18,500 ha. The fodder beet area has stood at around 8,000 ha for the past number of years
- Potato production area has dropped from over 20,000 ha in the mid 1990's to close on 8,700 ha in 2012.

3.3 Current Market Position

The latest data available from the International Grains Council[1] forecasts that total world grain production will fall by 4.0%, to 1,776 million tonnes in the year 2012/13. Crop production forecasts are lower for each of the main producing regions internationally. Global carry out stocks for all grains are expected to fall by 33 million tonnes by the end of 2012/13.

The forecast production of wheat is 662 million tonnes, leaving global stocks down 18 million tonnes on last year at 180 million tonnes which represents a four year low by the end of 2012/13.

The 2012/13 outlook for maize production is 838 million tonnes, down 4.0% year on year. World maize stocks are forecast to fall to a six year low.

Within the European Union, the latest Strategie Grains estimates[2] for the 2012 harvest show the total area under cereals at 59 million ha and forecasts total production of 270.5 million tonnes, representing a 5% decrease on the 2011 harvest. These latest estimates put production of soft wheat at 124 million tonnes (a drop of 4% on 2011), durum wheat at 8 million tonnes (down by 1%), barley at 53 million tonnes (up 3%), maize production at 54 million tonnes (down 8%), rye production at 8 million tonnes (up 21%), and other cereals at 23 million tonnes (up 1%).

Current indications are that harvest prices will be considerably higher in 2012 because of supply and demand conditions and the forecasted carry out stock levels. Green prices for feed grain in Ireland were at €150 - €160 per tonne at harvest 2011 but, in line with world and EU prices, moved upwards significantly towards harvest 2012. As international production forecasts decreased, prices increased considerably and are currently in the order of €200 - €210 per tonne.

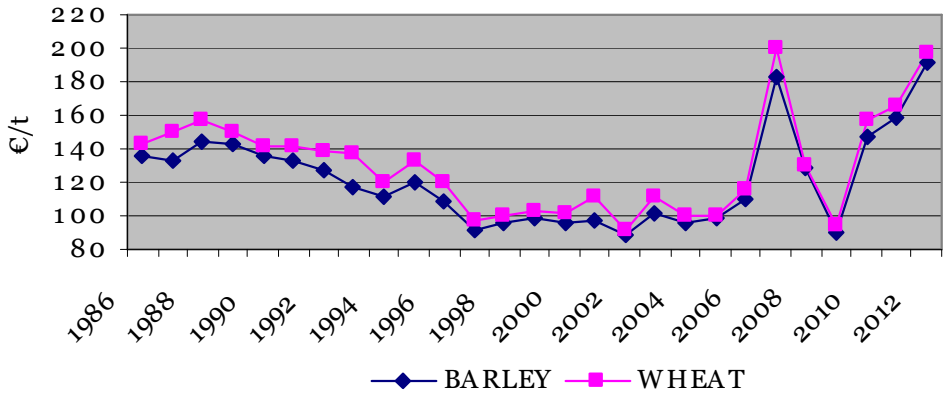


Figure 3.1: On-account Cereal Price (1986 - 2012)

[1] 23rd August 2012
[2] 13th September 2012

In Ireland for the 2012 harvest, the area planted to the main cereal crops in Ireland increased to 315,000 ha (Figure 3.2).

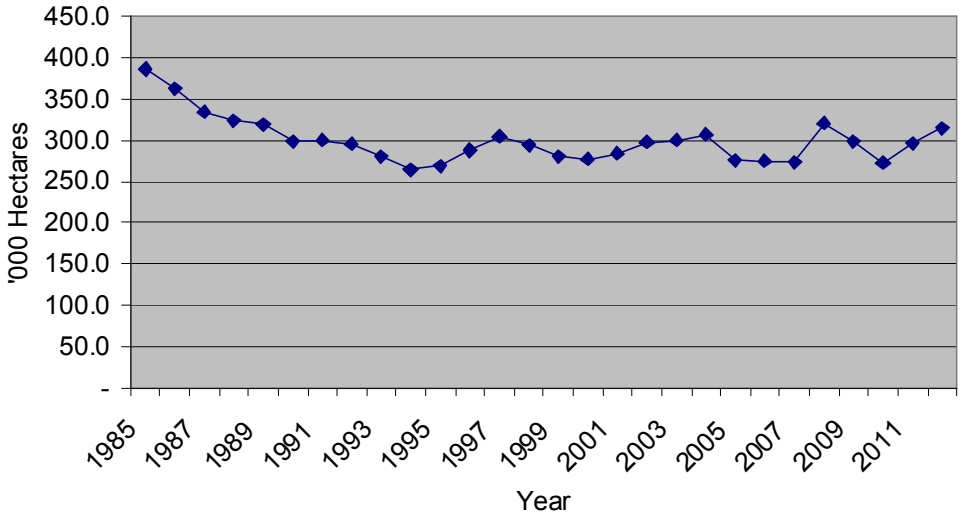


Figure 3.2: Total Cereal Area in Ireland (1985-2012)

The EU has been self-sufficient in cereals since the early 1980s, although with the introduction of market management measures in the 1990s the level of self-sufficiency decreased but has remained over 100% to date. In the period since the 2001/2002 marketing year, Ireland's self-sufficiency in cereals has ranged between 74% and 91%. In the latest year for which data are available (2010/2011) Ireland was 74% self-sufficient (Figure 3.3).

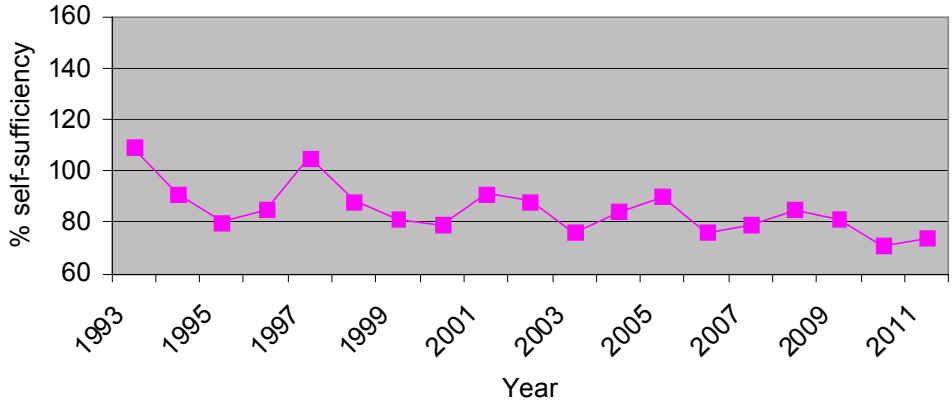


Figure 3.3: Cereal Self Sufficiency in Ireland (1993-2011)

Source: Eurostat/CSO data

3.4 Market Outlook

Two information sources are used to indicate EU market trends:
(1) EU Commission "Prospects for agricultural markets and income in the EU 2011-2020 and
(2) 'FAPRI – Ireland Forecast for Cereals (2011).

3.4.1 EU Commission Forecast for Cereals

The **"Prospects for agricultural markets and income in the EU 2011-2020"** published in December 2011 projected that the medium-term prospects for EU cereal markets will be characterised by tight market conditions, low stock levels and prices remaining above long term averages. However, greater fluctuations in future cereal prices are also expected compared with the past. These developments are driven by moderate supply growth reaching 305 million tonnes by 2020, mainly the result of low yield growth rates (0.5% per year on average), and an increase in the domestic use of cereals in the EU, most notably due to growing demand by the ethanol and biomass industry in the framework of the 2008 Renewable Energy Directive (RED). Some reallocation between crops in the context of a stable overall cereal area is expected, with maize and soft wheat further increasing their share (up to 16% and 39% respectively) at the expense of other cereals, most notably barley which is expected to drop to 21% of total cereal area.

Similar drivers impact upon the medium-term prospects for the EU oilseed markets, which show a positive outlook for producers with strong demand and high oilseed oil prices. Supply growth is expected to result from moderate yield growth and to a lesser extent from a slightly expanding oilseed area. The expected increase in domestic use of oilseeds in the EU would also be driven by additional growth of the biodiesel and biomass industry following the initiatives taken by Member States in the framework of the RED. The trade balance is not expected to improve over the medium term as additional imports are required to meet the biofuel targets.

The medium-term prospects for EU sugar markets are mixed. The growing demand for ethanol in the framework of the RED supports a growth in sugar beet production geared towards ethanol. On the other hand, for food consumption, isoglucose is expected to increasingly replace beet sugar, following the expiry of quotas in 2015.

Table 3.1: EU Commission Cereal Forecast Balance Sheet for European Union, 2009-2020 (million tonnes)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	294.1	277.9	277.3	282.4	282.4	285.7	287.6	292.8	294.8	299.0	300.8	305.1
of which EU15	211.8	199.2	195.1	201.3	200.7	202.3	203.1	206.2	207.0	209.3	210.0	212.3
of which EU12	82.3	78.7	82.2	81.1	81.7	83.3	84.5	86.6	87.8	89.7	90.8	92.8
Consumption	280.5	276.7	277.7	273.5	275.4	276.0	280.0	283.0	286.0	288.7	290.7	293.4
of which EU15	213.4	211.7	212.1	207.9	209.2	210.0	213.5	216.1	219.0	221.3	223.2	225.5
of which EU12	67.1	65.1	65.6	65.6	66.1	66.1	66.5	66.9	67.0	67.4	67.5	67.9
of which food and industrial	64.8	65.1	65.5	65.5	65.5	65.7	65.7	65.9	65.9	66.1	66.2	66.4
of which feed	172.6	167.5	166.7	161.5	160.4	158.6	160.8	161.2	161.8	161.9	162.1	162.5
of which bioenergy	7.6	9.3	10.5	11.9	15.2	17.7	19.4	22.0	24.0	26.3	28.3	30.3
Imports	8.0	13.3	16.4	12.2	12.4	11.1	12.6	11.3	12.2	11.9	12.5	12.0
Exports	27.4	31.8	20.8	22.6	19.9	20.5	20.1	20.5	20.3	21.1	22.0	22.8
Beginning stocks	60.3	54.5	37.1	32.3	30.7	30.3	30.6	30.6	31.2	31.9	33.2	33.8
Ending stocks	54.5	37.1	32.3	30.7	30.3	30.6	30.6	31.2	31.9	33.2	33.8	34.8
of which intervention	6.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

// The years indicated represent marketing year N/N+1 (i.e. 2009 = 2009/2010)

Table 3.2: EU Commission Total Oilseed* Forecast Balance Sheet for European Union, 2009-2020 (million tonnes)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Usable production	29.8	29.4	28.6	29.5	30.0	29.8	30.7	30.8	31.8	31.5	32.7	32.1
of which EU15	19.5	18.9	17.9	18.9	19.2	19.0	19.6	19.7	20.3	20.1	20.9	20.5
of which EU12	10.3	10.5	10.7	10.6	10.8	10.8	11.1	11.1	11.4	11.4	11.8	11.6
Consumption	45.8	46.8	45.1	46.6	47.7	47.4	48.3	48.0	49.3	48.7	50.5	49.3
of which EU15	39.4	40.2	38.6	40.1	41.1	40.8	41.7	41.4	42.5	42.0	43.6	42.6
of which EU12	6.4	6.5	6.5	6.5	6.6	6.6	6.7	6.6	6.8	6.7	6.9	6.8
Imports	16.5	17.4	17.8	17.8	18.3	18.2	18.3	17.9	18.3	17.9	18.5	17.9
Exports	0.9	0.8	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7
Beginning stocks	4.9	4.5	3.7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Ending stocks	4.5	3.7	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2

* rapeseed, soybeans, sunflower, cottonseed and groundnuts; # The years indicated represent marketing year N/N+1 (i.e. 2009 = 2009/2010)

Source: http://ec.europa.eu/agriculture/publi/caprep/prospects2011/fullrep_en.pdf

3.4.2 FAPRI-Ireland Forecast for Cereals

The FAPRI-Ireland "Baseline and Food Harvest 2020 (FH2020) Outlook for EU and Irish Agriculture (2011)" report of November 2011, provides analysis of the prospects for the agricultural and food sectors in Ireland and the EU over the period 2011 to 2020, under (i) a baseline and (ii) a Food Harvest Scenario. However since the publication of this report international prices for the main cereal and grain crops have moved upwards significantly. In addition, the latest estimates from the FAPRI – US team on projections for world and EU cereals prices up until 2020/21 are ahead of those published in 2011.

Latest estimates from the FAPRI World model show upward movement in cereal prices not just for the current position (2012) but also for the projection end period of 2021, relative to a baseline of 2009/2010/2011. Exchange rates are projected more or less static over the projection period.

It is also, however, important to note that cost pressure will be evident over the projection period, especially for energy and fertiliser prices. In terms of the effect cost and output price changes may have on cereal area, it is clear from simple univariate analysis of historic relationships between cereal prices and cereal area (based on Irish data) that lagged cereal prices have a significant effect on cereal area planted. Hence, all other things been equal, it can be expected that cereal area in European/Irish terms will increase to some degree from projected increases in cereal price. But it must be remembered that competition from alternative land uses must be borne in mind over the projection period. While output prices for cereals by 2021 are expected to be higher in nominal terms than recent year averages, competition from the dairy sector in Ireland in particular cannot be understated given the expansionary environment that is expected to operate post 2015.

While uncertainties have always accompanied projection exercises in the cereals sector, they may be even more relevant in the future. Among the most prominent emerging uncertainties likely to affect the cereals market in the coming years are; oil prices, energy policies (biofuels), GMO issues, freight rates, developments in agricultural and trade policies and weather-related factors.

3.5 Farm Level Analysis

Farm level analysis by the Teagasc, Agricultural Economics and Farm Surveys Dept. indicates the current and historic economic status of the Irish tillage sector. The review outlined in this section compares the economic competitiveness of the sector (i) within Ireland on a farm income and viability basis; (ii) within the sector amongst competing crops on a gross margin basis; and (iii) on an EU basis using technical performance and cost/output as an indicator of competitive performance.

3.5.1 Farm Income from NFS

The 2011 National Farm Survey ([1]Hennessy *et al*., 2012) indicated that the average family farm income for mainly tillage farms was €35,800 compared with an average family farm income for all farms of €25,000 (Figure 3.3). In 2011 direct payments (including Single Farm Payment, REPS and Disadvantaged Area Payments) on average accounted for 75% of total family farm income on tillage farms compared with 73% on average for all farms.

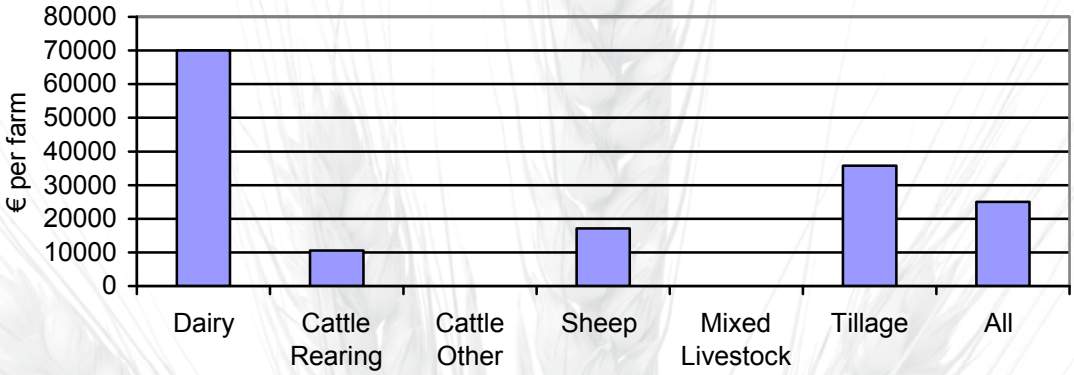


Figure 3.3: Family Farm Income x System (2011)

Source: Teagasc, National Farm Survey

Another interesting statistic to observe from the NFS data is the income per labour unit (Figure 3.4).

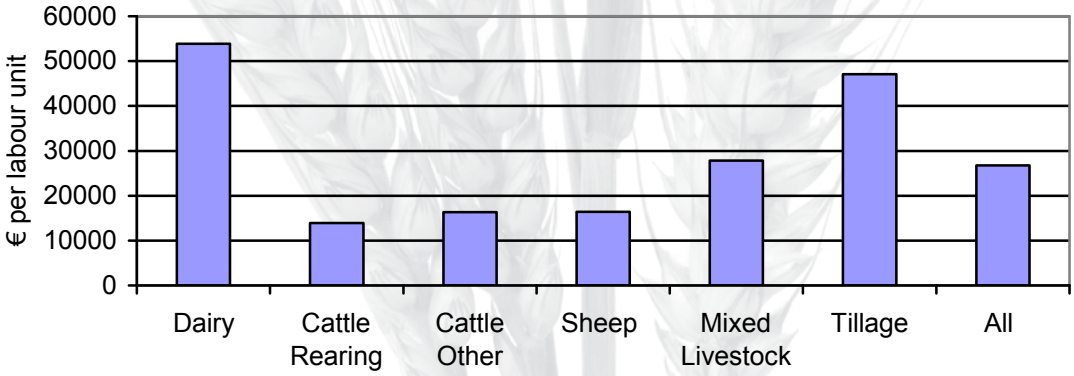


Figure 3.4: Family Farm Income per labour unit x System (2011)

Source: Teagasc, National Farm Survey

[1]*Hennessy T., Kinsella A., Moran B., and Quinlan G. (2012) National Farm Survey 2011. Agricultural and Farm Survey Department, Teagasc*

Figure 3.4 shows that while income per labour unit is still highest on the specialist dairy system, the specialist tillage system follows closely in second position. The disparities between the dairy and tillage systems are reduced when the income is expressed per labour unit given that the average labour input in tillage systems is less than that on dairy systems.

3.5.2 Farm Viability Analysis using NFS Data

The concept of viability is useful in determining necessary future change in farm structure. A study comparing the viability of the different enterprise groupings of the NFS in 2011 was conducted. In this study farms were deemed viable if they had: (a) the capacity to remunerate unpaid family labour at the average agricultural wage, and (b) the capacity to provide an additional 5% return on non-land assets. With this definition 61% of farms in the tillage category were classified as economically viable, compared to 79% of dairy farms, and 35% of all farms (Figure 3.5). Economically non-viable businesses can be sustained by income from off-farm sources. When this income was included in the analysis, 87% of tillage farms were still economically sustainable, compared to 66% in the wider farming population.

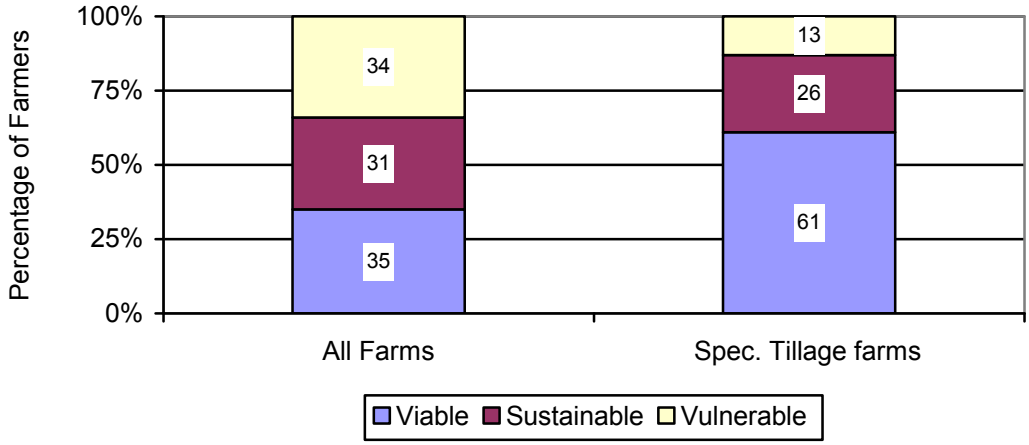


Figure 3.5: Viability of Tillage Farms versus All farms (2011)

Source: Teagasc, National Farm Survey

3.5.3 Crop Gross Margins from NFS

In terms of competitiveness within the tillage sector, it is interesting to observe historic competitiveness between individual crops. Figure 3.6 illustrates the trend in gross margin over the past decade using data from the NFS. Average gross margin per ha for all winter crops is generally higher than the gross margin for spring sown crops. For the majority of years examined over the recent past, winter wheat returned the highest gross margin per ha and spring feed barley returned the lowest gross margin per ha.

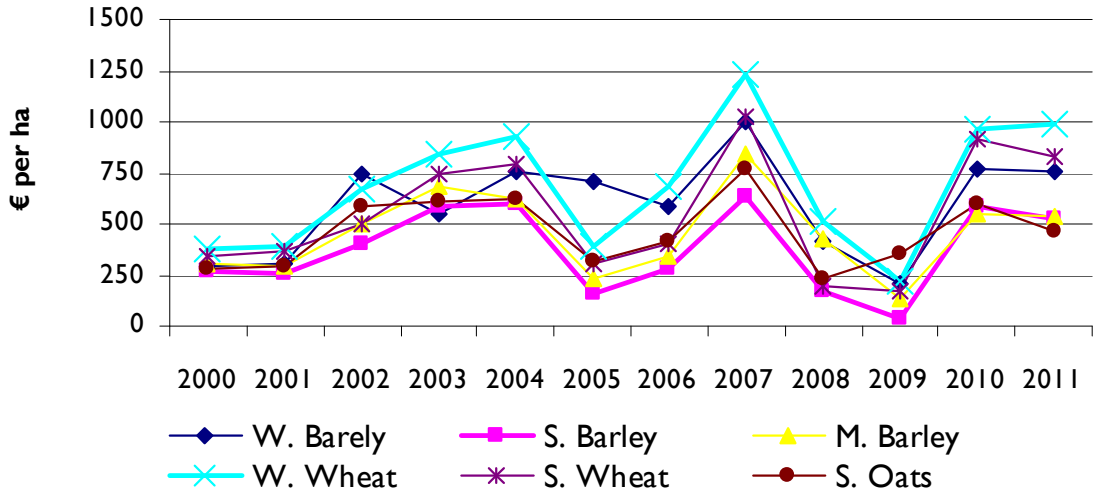


Figure 3.6: Crop Specific Gross Margin per ha (2010-2011)

3.5.4 Competitive Performance

While is it important to understand our cost and return structure to inform planting decisions, it is perhaps more important to understand our competitive ability in terms of the cost and return structure of our main trading partners. For this purpose, data from the European Commissions' Farm Accountancy Data Network (FADN) was consulted to determine how our costs compare to other cereal sectors within Europe. Further details on the results of this analysis can be found in [3]Carroll *et al.*, 2008.

Costs of production as a percentage of market based output for specialist cereal farms were collated for the most recent years available. Figure 3.7 presents the competitiveness indicators based on the definition of cash and imputed costs as outlined in Box 1 below.

Box 1: Definition of Costs

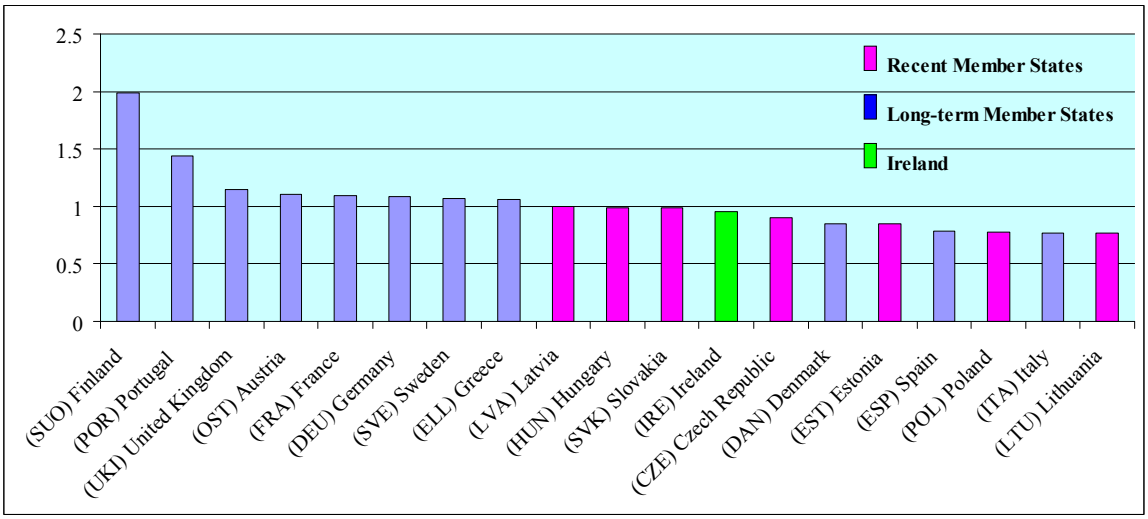
Cash costs: include all specific costs, directly incurred in crop production, for example fertiliser, plant protection products, seeds etc. plus external costs such as wages of hired labour, rent and interest paid.

Imputed costs: include family labour, equity capital and owned land. Imputed costs for land and labour were derived by using FADN measures of average land rental and agricultural labour rates in each country.

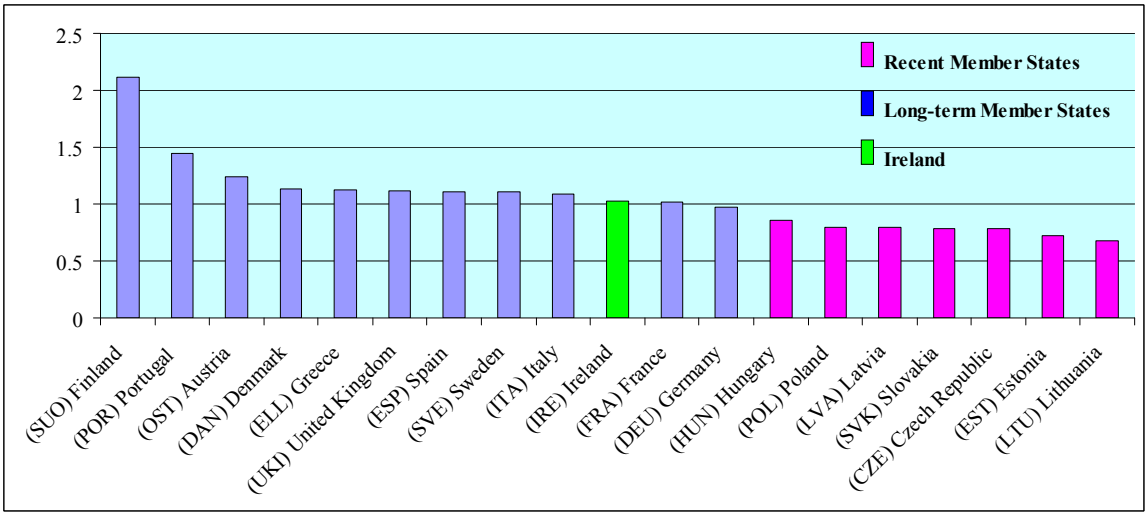
The examination of the cash costs of cereal production in isolation can be useful in that cash costs as a percentage of output value can be used to measure the resilience of the cereal sector to cope with a price-cost squeeze over the short run. For a true competitiveness comparison, however, it is also important to consider the opportunity cost of owned resources. This gives a measure of the total economic costs of production: in the long-run both cash and imputed costs must be covered if the business is to be sustained. Imputed costs can also be used as a leading indicator of the potential for the average cereal farmer in the EU Member State to expand profitably, as they reflect the typical costs of land and labour in each country.

[3]*Carroll J, Newman C. and Thorne F. (2008) An Examination of the Productivity of Irish Agriculture in a Decoupled Policy Environment. Research Stimulus Fund No 05 207- Final Report. Teagasc*

A: Cash Cost Competitiveness
(Costs as % of Output Relative to EU Average)



B: Economic Cost Competitiveness
(Costs as % of Output Relative to EU Average)



Source: [3]Carroll et al., (2008). Analysis based on EU FADN data

Figure 3.7: Cereals sector Cost Competitiveness for Selected EU Member States (indexed to weighted EU average)

Recent Members States perform well for both cash and economic costs indicators but particularly so for economic cost competitiveness which is due to low opportunity costs associated with owned land and family labour. Average land rental charges (per ha) for recent Members States are below €50 per ha compared to approx. €180 for long-term members. Similarly, the average cost of hiring one working unit is in the region of €5,000 in recent members and around €20,000 for long-term members.

[3]*Carroll J, Newman C. and Thorne F. (2008) An Examination of the Productivity of Irish Agriculture in a Decoupled Policy Environment. Research Stimulus Fund No 05 207- Final Report. Teagasc*

While Irish economic competitiveness appears relatively low at 10th place, the situation improves to 3rd (behind Germany and France) once only long-term Member States are considered and is slightly above (3%) the overall EU average. Irish cash competitiveness is 8th overall and 4th for long-term Member States behind Italy, Spain and Denmark.

Further analysis of the competitiveness indicators presented in Figure 3.7 shows that the low opportunity cost of working capital for recent Member States is evident (working capital ratio for these countries is, on average, over 62% lower than the overall EU average) and is the primary source of economic competitiveness for these countries. Ireland's competitive advantage lies in its relatively low overhead, external factors and fixed assets (imputed cost) ratios which are 12, 14 and 33% lower than the EU average respectively. Its competitive disadvantage lies in its high specific costs and working capital ratios which are 14 and 20% higher. The opportunity cost of owned land and labour is considerably higher than in competing EU Member States. In addition, the competitiveness of the overall Irish economy has improved in recent years.

Chapter 4: Individual Crop Analysis

Methodology Notes

The material in the following section was developed by the two working groups for combinable and non-combinable crops with information on individual crop statistics gleaned from industry sources, CSO and Teagasc data. The growth opportunities tables are based on close examination of existing markets and discussion with end users as to where they see their markets developing and where they would like to source raw material. In the case of energy crops, they are based on the production expected to be needed to meet government targets. For obvious commercial reasons the details of individual companies plans have not been disclosed. The figures are realistic individual crop potentials, but may not be cumulative and should not be combined and treated as a prediction for the entire sector. For each crop an 'additional market' is quantified and valued at farm gate prices. It is assumed that these increased markets will require additional seed production and the added value of this seed is incorporated in the additional values outlined.

It has not been possible in the limited time available to produce this study to undertake a detailed formal economic analysis of the job creation potential associated with these targets. Therefore, the quoted employment creation estimates are indicative and rely on an assessment of results from studies that have already been produced for the FH2020 HLIG.

4.1 Barley

Current Position

- Barley is the largest cereal crop in Ireland. The total area of this crop fell for many decades but this has levelled off and increased somewhat in recent years.
- We currently grow 184,000 ha of winter and spring barley to produce nearly 1.3 million tonnes of grain.
- The winter crop is increasing in popularity in recent years as a result of improved varieties and very high yield potential from six-row types. This is increasing total barley production.
- Barley is primarily used for feed production (87% area). Demand for feed is likely to increase given the plans for increased production in the livestock sector in FH2020.
- A significant proportion of the area (23,500 ha or 13%) produces barley for premium malting and roasting markets. Demand for malting barley is also likely to increase with planned expansion by malsters and increasing demand for barley and malt for distilling at home and abroad.

4.1.1 Strengths

- Feed barley is a natively produced cereal ideally suited for ruminant and mono-gastric feeds.
- Demand is likely to increase to meet the feed requirement of the increased livestock production proposed in FH2020.
- It can supply a number of premium markets such as malting, roasting and seed for both home and export.
- Supplies quality straw for the livestock sector.
- The crop has seen significant improvement in yield potential in recent times arising from genetic improvements in both winter and spring varieties.
- Highly competent growers use proven modern technology to produce very high yielding crops.

- In can be grown successfully in monoculture but will still benefit from rotation. Barley is less susceptible to diseases such as take-all and eyespot compared to wheat.
- Spring barley tends to be more tolerant to adverse weather than winter wheat and it is well suited to our soils and our climate and so production can easily be expanded.
- The risk of disease resistance to fungicide currently seems less pronounced in barley.
- Barley has a lower production cost per unit area and is simpler to grow than wheat.
- Barley has many storage options including drying, aeration, alkali or acid treatment, crimping, whole-crop etc. It is marginally less expensive to dry than wheat.
- It has a low carbon footprint with full traceability to support the Brand Ireland initiative of FH2020.
- Barley works very well within environmental-type schemes, requiring less total chemical input and lower fertiliser N input.

4.1.2 Weaknesses

- Production costs (land, fertilizer, fuel, sprays, machinery, land fragmentation etc) are high and impact on competitiveness as these costs increase over time. Land mobility and price volatility are particular concerns.
- More commonly grown spring crop has lower yield potential than winter crop.
- Over winter nitrogen loss can occur on some soils through leaching if winter cover is not used.
- Winter crop is more susceptible to abiotic stresses In Irish conditions.
- Vulnerable to losses caused by diseases, lodging and birds.
- Dependant on access to effective fungicides which are threatened by legislation.
- Bulk of the crop must be dried with additional costs.
- The malting barley market is volatile and this affects both the premiums paid and the potential for exports.
- Feed export opportunities are sporadic but the Northern Ireland market may prove more consistent.
- Lack of rotation can limit yields.
- Late season diseases can adversely affect grain quality in wet years.
- Less suitable for heavy or wetter soils.

4.1.3 Opportunities

The opportunities in terms of additional market, value and extra area required are summarised in Table 4.1. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Expansion in beef and dairy as indicated in the FH2020 projections, while fuelled mainly by grass, will increase demand for concentrate feedstuffs and consequently feeding barley. Possible limitations to imports of GM feeds may exaggerate these increases.
- Increasing demand for malting and roasting will increase production requirements. Export markets are being developed for malting barley.
- A doubling of demand for distilling is catered for within the malting and feed barley production estimates.
- Feed barley exports to Northern Ireland are likely to increase.

- Use of animal manures and composts can be used to decrease production cost whilst increasing yield potential and grain quality, especially protein content in malting barley.
- Increased winter barley crop will provide increased opportunity to plant winter oilseed rape.
- The yield potential of new varieties is increasing and many of these also bring improved disease resistance.
- Barley has a traceable grain supply chain with a green image, is produced locally for local use and has a low carbon footprint and supports Brand Ireland.
- Husbandry to increase protein levels in barley will help to replace protein imports.

Table 4.1: Summary of Growth Opportunities for Barley in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Malting	115	23.7	14,000
Feed	348	62.7	25,160
Roasting	3.8	0.73	500

(Prices: Malting €205, Feed €180, Roasting €190)

4.1.4 Threats

- Vulnerable to increasing input costs such as fertilizer, fuel, chemicals etc.
- Cheap grain imports will occasionally occur to undermine price and profitability.
- Price volatility for grains coupled with frequent out-of-phase shifts in input prices can impact on margins.
- Lack of efficiency in farm units due to land fragmentation, land availability and cost.
- Resistance developing to fungicides, herbicides and insecticides and the probable loss of triazole fungicides due to pesticide legislation changes.
- Lack of focused breeding of disease resistant / tolerant varieties suitable for Irish climate.
- Increased competition for land between crop and animal enterprises could make it very difficult to achieve the expansion indicated.
- Greening in CAP reform may force rotation and decrease barley area
- Improved grassland management may decrease 'compound feed' requirement.
- Competition from imports of GM feed grains.
- Competition from increasing availability of dry distillers grains from bioethanol production.

4.1.5 Actions needed to Achieve the Potential

- Intensive research to ensure growers can achieve necessary quality standards for malting barley in the areas of protein level and prevention of ear blight is essential.
- Access to a broad spectrum of fungicide tools must be maintained to help prevent resistance developing to limited fungicide families.
- Increased production of barley will require additional land and storage. Improved cost effective and stable land access systems must be developed to facilitate this area expansion.

- Information on the legal use of chemicals must be freely available to help avoid the risk of improper use.
- Increasing yields and reducing production costs will be necessary to remain competitive.
- Breeding varieties with improved disease resistance, yield potential and grain quality for our climate.

4.1.6 Legislative/Policy Changes required to Achieve Potential

- The reform of the CAP must not force small producers to rotate crops as such a move is likely to drive them out of cereal production.
- Access to triazole fungicides in particular must be maintained to help slow the development of resistance in diseases like Rhynchosporium and net blotch.
- Longer term access to land must be encouraged to help improve the productivity of land.
- A facility must be put in place to enable easy access to organic manures to help performance in cereals and alleviate a disposal problem for intensive livestock producers.
- The use of native traceable products must be encouraged within the Brand Ireland image.

4.2 Wheat

Current Position

- Wheat is the second largest cereal crop in Ireland. Annual production varies with autumn weather which impacts on planting levels.
- We currently grow 91,800 ha of winter and spring wheat to produce nearly 0.82 million tonnes.
- Winter sown wheat has a higher yield potential and accounts for 75% - 80% of total wheat production.
- Wheat is primarily used for feed production (94% of output). Demand for feed is likely to increase given the plans for increased production in the livestock sector in FH2020.
- A small proportion of wheat (6%) is sold to the milling market but this varies form season to season due to difficulties meeting milling standards in our climate.
- While average wheat yields are high, production costs are also high and productivity is reduced in unfavourable positions in rotations (2nd wheats or continuous wheat).

4.2.1 Strengths

- Feed wheat is a natively produced cereal ideally suited for ruminant and mono-gastric feeds.
- Wheat supplies a deficit Irish feed market with opportunities for increased production and import substitution.
- Demand is likely to increase to meet the feed requirement of the proposed increase in livestock production in FH2020.
- Winter wheat has very high yield potential and produces the highest cereal output per ha
- Small premium market for the retail milling industry.
- Continuing progress in breeding new varieties.

- Growers are technology receptive and utilize very good growing technology proven by research and supported by good advice.
- Wheat supplies quality straw for feed (preferred straw in mixed rations) bedding, energy and composting.
- Adequate supply of all production facilities, on-farm and post-farm.
- Suitable for heavier soils and can be grown in monoculture but at lower yield levels.
- Flexible storage/processing options include drying, aeration, preservatives, crimping or whole-crop.
- It has a low carbon footprint with full traceability to support the Brand Ireland initiative of FH2020.

4.2.2 Weaknesses

- Production costs (land, fertilizer, fuel, sprays, machinery, land fragmentation etc) are high and impact on competitiveness. Land mobility and price volatility are particular concerns.
- High risk from diseases like septoria and ear blight with the ongoing threat of fungicide resistance and threatened loss of fungicide options through legislation
- Yield stagnation threat contributed to by: reduced breeding gain, poor rotation, soil organic matter decline, etc.
- Limited break crop options to precede first wheat, with the viability of second and continuous wheat crops questionable.
- Planted area of winter wheat is heavily influenced by autumn weather.
- Climate and late season diseases can adversely affect grain yield and quality at harvest and drying costs.
- Fragmented land base with high land costs.
- Heavily reliant on the feed grain market (commodity price driven) with little premium outlets.
- Export opportunity is sporadic but the Northern Ireland market should be more consistent.

4.2.3 Opportunities

The opportunities in terms of additional market, value and extra area required are summarised in Table 4.2. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Expansion in beef and dairy as indicated in the FH2020 projections, while fuelled mainly by grass, will increase demand for concentrate feedstuffs and consequently feeding grains. Possible limitations to imports of GM feeds may exaggerate these increases.
- A significant proportion of the extra demand is achieved through higher yields by better positioning of wheats in rotations, thus reducing the need for extra land while simultaneously reducing carbon footprint.
- Possibility of exploiting yield benefits of organic manures while alleviating nutrient management difficulties on livestock farms.
- Some milling wheat potential provided suitable varieties and bread products suitable for our attainable quality are focused on.
- Opportunity to build on our existing strengths in research, technology, climate, soils and skills to increase output and expand production.
- Exports to Northern Ireland are likely to increase.

- Greening in CAP reform may force more crop rotation which will increase the yield potential, profitability and competitiveness of wheat.
- Winter wheat is a very suitable crop to use during grassland reseeding. More reseeding seems desirable as grassland farmers strive to make more of grass and optimise grassland productivity.
- Crimping and wholecrop decrease processing costs for on-farm use.
- Scope to decrease production costs per tonne to increase profitability.
- Potential to grow more varieties with higher disease resistance levels.
- Traceable native grain supply with green image and low carbon footprint support the Brand Ireland effort.
- Potential market for energy.
- Could be used to meet over-winter green cover obligations.

Table 4.2: Summary of Growth Opportunities for Wheat in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Distilling	44	8.58	4,000
Feed (inc exports)	245	45.32	10,000

(Prices: Distilling €195, Feed €185, Export €200)

4.2.4 Threats

- Vulnerable to increasing input costs such as fertilizer, fuel, chemicals, machinery and land etc.
- Cheap grain imports can frequently undermine price and profitability.
- Grain price volatility coupled with frequent out-of-phase shifts in input prices can impact on margins.
- Lack of efficiency in machinery and fixed costs due to land fragmentation, land availability and cost.
- Resistance developing to fungicides, herbicides and insecticides and the probable loss of triazole fungicides due to pesticide legislation changes.
- Lack of focused breeding of disease resistant / tolerant varieties suitable for Irish climate.
- Decreasing soil productivity arising from compaction, loss of organic matter and lack of rotation.
- Improved grassland management may decrease 'compound feed' requirement.
- Competition from increasing availability of dry distillers grains from bioethanol production and possibly GM feeds in the future.

4.2.5 Actions needed to Achieve the Potential

- The anticipated need for and increased use of organic manures will require comprehensive research support.
- Increased research is needed to explore uses for Irish milling wheat even when milling quality is compromised in poor weather. Opportunities such as traditional soda bread should be considered and may have scope for designated protected product status.

- Scope for research in the use of wheat for distilling to supply Irish brands with native raw materials. Incentivised production may be needed to kick-start this niche market.
- Promote rotations to enhance yield potential.
- Research, advice and industry support required to address all the threat areas listed above including disease vulnerability, yield stagnation, costs including land and machinery, scale and price volatility. Particular emphasis on cost reduction is required.
- Specific quality standards and crop processing protocols (e.g. max drying temperature) need to be developed for specific markets.

4.2.6 Legislative/Policy Changes required to Achieve Potential

- Need to increase the number of people involved in crop research to help support this efficiency effort to redress the recent levelling of wheat yield increases.
- Need to comprehensively look at the implication of EU pesticide legislation on our ability to control troublesome diseases.
- Need to actively promote native feed ingredients to support Brand Ireland.

4.3 Oats

Current Position

- The current market for Oats is about 160,000 tonnes (grown on 21,000 ha) which is used for animal feed (mainly horses), milling for food use, and for seed and export.
- The feed market is split between premium grade for horse feeds, which has similar quality requirements to human food consumption, and discounted grade which is used in ruminant rations
- Market dependent on our ability to grow high quality product and is dependent largely on the variety Barra.
- Food grade oats demand is increasing for domestic milling and also for export.
- Horse feed exports are successfully being developed.

4.3.1 Strengths

- Oats is a low cost cereal crop supplying important expanding home and export markets for food and feed.
- Oats is increasingly seen as a healthy food grain for humans and also as a high quality feed for horses.
- It is a locally produced grain with full traceability and internationally renowned grain quality to support Brand Ireland.
- It is suited to our climate, does not get ear blight, has high yield potential and is a good break-crop for wheat.
- There is a high level of technology adoption in the sector with technically proficient growers and industry personnel.
- It provides straw that is suitable for many different end uses.

4.3.2 Weaknesses

- Successful production depends on high quality markets that are heavily reliant on one variety - Barra.
- Most varieties are very susceptible to foliar diseases - mildew and rust. Soil-borne viruses have decreased the areas suited to the winter crop.
- Spring varieties are susceptible to winter kill and frost heave in cold winters. Climate can adversely affect grain quality at harvest, especially grain colour and specific weight.
- Farm yields are not increasing over time and the crop is prone to lodging.
- Variability in quality - best oats grown in North Leinster and the South East, with many other areas marginal. Poor quality is discounted heavily.
- Market tends to be cyclical - price is very supply sensitive.
- Fragmented land base with poor farm structures and high cost. Land mobility and price volatility are particular concerns.

4.3.3 Opportunities

The opportunities in terms of additional market, value and extra area required for oats are summarised in Table 4.3. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Increasing export and domestic demand due to human nutrition benefits (breakfast cereals and snacks) and the high quality of Irish oats.
- Increased demand for oats for horses particularly for export markets. Increasing interest in oats as ruminant / dairy feed.
- Oats has good potential as an energy crop and the benefits of naked oats have yet to be harnessed.
- Greening proposals in CAP reform is set to force use of rotation and oats is a suitable break crop for wheat.
- Traceable grain supply with a green image providing a healthy ingredient with a low carbon footprint. Supports the development of Brand Ireland.
- Increased oat area will allow increased first wheat production with higher output/margins.

Table 4.3: Summary of Growth Opportunities for Oats in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Milling	12.3	2.34	6,000
Feed / Export	75.6	13.98	7,760

(Prices: Milling €190, Feed €180, Export €190)

4.3.4 Threats

- Cost base is quite high due to increasing fertilizer, diesel, land machinery and chemical costs.
- Loss of triazole fungicides would threaten ability to control foliar diseases.
- Rental land system and land availability, fragmentation and cost. There will be increased competition between crops and animals for land access making scale difficult to achieve.
- Price volatility in response to overall supply and demand.
- Lack of genetic improvement in terms of disease resistance, standing power and yield improvement in combination with grain quality.
- The risk of development of a mycotoxin problem.
- Lack of research and technology transfer to improve farm productivity.
- The spread of Wild Oats and soil borne Oat Mosaic Virus are a threat to expansion.

4.3.5 Actions Needed to Achieve the Potential

- We need to find new varieties that combine high yield potential with good standing power, good disease resistance (including mosaic virus) and with grain quality at least as good as Barra.
- As most markets depend on quality grain we need to have processing/cleaning facilities to ensure that we can make the quality to supply our premium export markets.
- Identify husbandry that will help protect winter sown crops against frost kill and frost heave.
- Need proven husbandry advice on how best to achieve good grain quality.
- Increased yields and in particular reduced production costs will be necessary to remain competitive.
- Need to capitalise on our oat crop advantage by promoting export markets and continuing to develop new food products that capitalise on the health benefits of this cereal.

4.3.6 Legislative/Policy Changes required to Achieve Potential

- Require pesticide legislation which accommodates adequate access to herbicides and fungicides for use on oats.
- Need continued access to glyphosate pre-harvest to ease crop harvest.
- Continued independent evaluation of new varieties.
- Recognition of oats as a break crop for new CAP greening proposals.

4.4 Pulses

Current Position

- Pulse crops (peas and beans) are currently minority crops with an estimated 18,700 tonnes produced from 3,500 ha annually.
- While peas for human consumption were significant, less than 4,000 tonnes are now produced with field beans for animal feed now being the main pulse crop grown. Lupins are occasionally grown.
- Ireland is significantly deficient in animal feed protein but the industry has not developed to fill this deficit.

4.4.1 Strengths

- Ireland and the EU are hugely deficient in protein sources thus ensuring high market potential and high prices.
- We can produce high (but variable) yields of good quality peas and beans whilst providing a good break crop in rotations, thus allowing first-crop wheat production to be increased.
- The ability of pulses to fix nitrogen decreases nitrogen requirement in the following crops.
- They are combinable crops - no additional equipment needed on farms.
- They are a natural native protein source that would support Brand Ireland image.
- Pulses are in big demand for coarse rations because they can be easily seen and are very palatable.
- They are a non-GM protein source for specific market needs.
- Less influenced by fertiliser price increases than other tillage crops.

4.4.2 Weaknesses

- Varieties still lack real suitability for the Irish climate and there is little international development in varieties.
- Relatively little research and technology support in all areas: from crop establishment to harvest and including post harvest processing and their best use in feed rations.
- Big seasonal impact on farm yield which is not well understood.
- N fixation is variable.
- Minority crops lack commitment throughout the industry, including research / technology support, merchants/feed industry etc.
- Feed industry is not well organised to handle small quantities of locally produced pulses. Difficult to dry, especially beans (although alternative storage options are available).
- No quality market of consequence; feed market only.
- Limited tools for successful weed and disease control in these crops.
- Production cost per ha is relatively expensive. Land mobility and price volatility are particular concerns.
- Price lacks transparency and is more based on grain commodity markets.
- Few opportunities to produce on contract or sell forward.
- Scale is needed for investment and industry development.

4.4.3 Opportunities

The opportunities in terms of additional market, value and extra area required for pulses are summarised in Table 4.4. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Europe is very deficient in feed protein. Global protein supply is likely to remain tight in the years ahead thus affording a genuine opportunity to develop this sector. There is further niche market opportunity in the non-GM protein sector.
- There is potential to treble the current production of pulse crops to help meet the increasing feed demand from FH2020 and also to substitute for imported protein sources.

- There is considerable scope to build a pulse protein market but this requires a commitment from all sectors, especially users. The industry suffers from having inadequate scale to justify real investment to sustain year-round supply so the primary incentive is to find ways to encourage increased production.
- Widespread production of pulses would provide a very useful break crops for all cereals and enhance overall performance in the rotation by helping the economics of other crops. Fertilizer N is likely to be increasingly expensive.
- There is potential to produce a quality product based on product markets for human consumption.

Table 4.4: Summary of Growth Opportunities for Pulses in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Peas	4	0.95	600
Beans	42	8.79	6145

(Prices: Peas €240, Beans €210)

4.4.4 Threats

- Lack of research /development of the crops at production and utilization stages.
- Fluctuating prices make it difficult for the industry to commit to long term development at every level from breeding to post harvest processing.
- An industry as small as ours may not wish to carry a number of break crops, be they pulses or oilseed rape. This may make it difficult to promote legumes. Lack of scale is a major impediment to development.
- Lack of plant protection tools for growers to successfully produce these crops.
- Pulse crop margins do not compete well enough with other crop options.
- The increasing costs of fertiliser, plant protection products, etc.
- Lack of a visible transparent pricing system with option to forward sell.

4.4.5 Actions Needed to Achieve the Potential

- Increasing the current pulse area will require much improved technical advice and tools. This means increased research to guide both rotation and husbandry and to quantify the residual benefits of these crops later in the rotation.
    - A better understanding of the nutritional constraints associated with these protein crops is needed. The consequences of cooking/toasting techniques on palatability needs to be assessed
    - Drying these large seeds remains a problem so alternative techniques need to be explored.
    - Alternative milling / processing techniques must also be examined to help overcome a perceived problem with dry beans for example.
- There needs to be a complete and co-ordinated industry commitment to the development of protein crops
- We need to maximise the potential benefit of every tonne of protein feed that can be grown in Ireland to help complement the concept of Brand Ireland.
- A production strategy is necessary for development of all animal sectors to help ensure that we are not over-exposed to feed market volatility.
- A transparent pricing system with forward-selling options is necessary.

4.4.6 Legislative/Policy Changes required to Achieve Potential

- Teagasc needs to recognise the benefit of maximising native ingredients and point the way to help maximise whatever native ingredients are available to help in the creation of an Irish export brand.
- Access to herbicides and fungicides for use on these minor crops is essential to make them appeal to Irish growers.
- Some form of incentive within the CAP Greening proposals is needed to help encourage growers to grow a small proportion of their tillage area in pulses.

4.5 Oilseed rape

Current Position

- Oilseed rape is now the most important break crop grown with an average of 8000 ha grown annually over the last 4 years; but having increased from 2,300 ha in 2003 to 17,000 ha in 2012.
- Improved price has been the main driver; added-to by good yields in 2010 and 2011.
- While biofuel initiatives spurred growth in 2006/7, these have ceased and production is now mainly for export for crushing (to produce oil and high protein cake) with consequent loss of value-added opportunity and carbon credits.
- There is interest in oilseed to produce specialist oils for cooking and food preparation.

4.5.1 Strengths

- Strong current demand and very high market prices make it very profitable. It is both an oil and protein source and so is helped by the current strength in both of these markets.
- High yield potential in our climate.
- As a combinable break crop, it uses the same machinery as cereal production.
- It is also a very good break crop for wheat and seed crops. An increasing awareness of the benefits of rotation is increasing grower interest in the crop.
- Good management can allow for reduced production costs through the use of organic manures, accurate targeting of fertilisers, and optimising establishment systems.
- Crop can be grown for the industrial or food grade markets.

4.5.2 Weaknesses

- There is limited research and technology support in all areas. Production technologies must be matched to our climate and soils.
- Reliability of production is not as good as with cereals and there is a higher risk of production losses.
- Oilseed rape is still a relatively minor crop that will require sustained support from all sectors in the industry to ensure it reaches stable production levels.
- Lack of support for rape oil utilization means that the bulk of the crop must be exported for crushing.
- There is limited information on the use of its protein cake by-product for animal feed and its associated dietary limitations.
- There is no significant quality market at the moment for rape products.
- It has a high production cost and profitability is influenced by high fertilizer prices. Land mobility and price volatility are particular concerns.
- Yield potential may be reduced as production volume increases and disease losses increase.

4.5.3 Opportunities

The opportunities in terms of additional market, value and extra area required for oilseed rape are summarised in Table 4.5. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Demand for rape oil and protein cake is very high due to tight supplies in the oil and protein markets.
- Research would help us capitalise on the high yield potential of rape, given that it seems to like mild winters and long days with cool temperatures to fill the seeds.
- We have a lot of suitable sites that can be used to ensure the purity of some new food grade alternatives.
- Further development of this industry would require sustained commitment from many sectors plus incentives to have the crop crushed at home so that the protein cake remains in Ireland.
- Rape can provide a very attractive break crop to enhance the production opportunities for cereals.
- There is a potential quality market based on products for human consumption and other niche uses. Our green image can be harnessed to help market food grade cooking oils even in other countries There may be scope to have designated protected product status for some products.
- There is a big requirement for biodiesel to help meet our renewable fuel obligations.

Table 4.5: Summary of Growth Opportunities for Oilseed Rape in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Food	39	15.5	7,800ha
Crushing	216	86.4	44,000ha

(Prices: OSR €400)

4.5.4 Threats

- Drop in market prices, as all vegetable oil sources compete in the same market and are influenced by energy prices.
- High yields may prove difficult to sustain as the crop increases in popularity and sources of disease infection become closer. Possible development of more troublesome diseases or decreased fungicide efficacy.
- Yield volatility / risk may be a significant issue leading to a reduced uptake by growers.
- Our lack of relevant research /development for Irish conditions.
- All sectors may not commit to the increased production and utilization of oilseed rape products.
- Increasing input costs such as fertilizer, chemicals fuel and land would reduce profitability.
- Inadequate crushing capacity would result in continued exports and the loss of some of the net benefit of the crop to the producer and the country.
- Failure by government to acknowledge the potential of this crop to produce biofuel.

4.5.5 Actions Needed to Achieve the Potential

- Research is needed to meet the requirement for high yields as area increases.
- A market for oil must be established in this country to help justify the requirement for crushing facilities, to retain the added-value benefit of both the oil and protein cake on the island.
- Increased crushing capacity is needed.
- Increased access to chemical control tools is necessary, especially for weed control.
- Export market opportunities need to be actively promoted.

4.5.6 Legislative/Policy Changes required to Achieve Potential

- Steps must be taken to enable crushing of oilseed rape oil on this island and to secure access to the biofuel market allowing up to 84,000 tonnes of plant oil utilisation.

4.6 Potatoes

Current Position

- The potato area has declined from 12,600 ha in 2004 to 8,722 in 2012 with yields static at 38 tonne/ha seed potato exports have nearly ceased.
- 62% of the production is in the counties Meath, Dublin, Louth and Wexford.
- Growers profit margin has been extremely price sensitive. Even a modest price change from €250 to €180/tonne would cause profit to drop from €4600 to €53/ha
- The current market breakdown for potatoes is outlined in Table 4.6.
- Per capita consumption has declined by 23% in a decade, however, consumption of processed potato-based foods has increased.

Table 4.6 : Current Irish Potato Market

Category	Quantity ('000 tonnes)	Domestic supply (%)	Comment
Ware potatoes	170	90-100	Grocery and wholesale
Peeling	80-60	15-85	Peeling + food service outlets
Chips	30	5-10	Imports from October
Process/Crisps	32	80	Crisping
Salad potatoes	30	10	Increasing in south east
Seed	22	77	Imports increasing
Frozen products	82	0	100% imported

4.6.1 Strengths

- Produced for domestic market, locally traceable with quality assurance scheme.
- Consumer recognition of Irish varieties (Rooster, etc.) and viewed as value for money and versatile.
- All year around supply (main crop); high level of potatoes meeting stringent market demands (pre-packed).

- Purchased by most population demographic categories.
- Local grower diversification into niche markets.
- High yield potential with good level of technology adoption by growers.
- Break crop for rotation.
- Adequate long term ware storage capacity.
- High quality seed used, indigenous seed breeding programme has a focus on breeding for a local market (among others).
- Approximately 50% of growers have access to irrigation (helps to secure high value markets).
- Identified as a country with a high seed production status; land base largely PCN free.

4.6.2 Weaknesses

- Price fluctuation's due to annual potato supply difference (yield variation mainly).
- The consumer market is price-sensitive leading to substitution with pasta/rice.
- Increase in cheap imports into Ireland (ware and peeling).
- Static consumer consumption of ware potatoes.
- Potatoes used as a loss leader by major retailers. Concentration of purchasing power by leading retailers (control 80% of retail market), weak bargaining power of growers, lack of co-ordinated sales by growers.
- Few exports of seed potatoes (217 tonnes in 2010).
- Wet climate increases planting/harvesting difficulties and increases disease/pest control costs.
- Potential reduction of pesticide availability to control disease/pests.
- Large investment in machinery and buildings.
- High cost of production, high levels of waste across supply chain.
- Lack of irrigation on 50% of farms (needed to consistently access premium markets).
- High proportion of crop planted on expensive rented land. Land mobility and price volatility are particular concerns.
- PCN risk in areas in the north east due to limited rotation.
- Reduced advisory service activity at farm level, little or no agronomic research in Ireland.

4.6.3 Opportunities

The opportunities in terms of additional market, value and extra area required for potatoes are summarised in Table 4.7. These are potential but realistic figures. Whether they are achieved will depend primarily on development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Increase/maintain consumption of fresh potatoes (dependent on sustained marketing campaign). The increased volume needed can be achieved from better agronomy on current area.
- Grower diversification from ware potato production into other markets will help to increase the sectors output value without a detrimental effect on cropping area.
- Opportunity for seed exports. (Previous seed export volumes reached 9,000+ tonnes).
- Replace/reduce imports of salad/baby potato market by increasing Irish production and strongly branding its Irish origin.

- Replace/reduce imports by the local chipping trade through increased Irish production of suitable varieties (Markies, Maris Piper).
- Replace/reduce imported peeling/processing market through increased Irish production - this could be delivered from existing ware potato area (increased yields and reduced losses).
- Increase marketable yield and reduce costs by reducing waste by 20% in ware production.
- Re-organisation of supply chains to help fulfil an orderly market supply.
- Increased production (volume and output value) is possible by increased use of chitting and better agronomy practices.
- Genetically enhanced potatoes may offer potential to reduce pesticide inputs (blight in particular).
- Variety development would help develop substitutes for much of the imported potatoes.
- Research should be undertaken to reduce costs and improve: yield, disease control and competitiveness.

Table 4.7: Summary of Growth Opportunities for Potatoes

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Seed	10,000	2.55	285
Salad	9,000	3.29	300
Chips	15,000	4.35	430
Peeling	33,000[1]	7.09[1]	457

Based on ware price per tonne of €215, Seed premium +€40, Salad +€150, Processing +€75.

Note: Approximately 50% of the potential extra peeling market in this table is supplied by reducing waste in the ware trade.

4.6.4 Threats

- Ware potato consumption is very price sensitive. Traditional consumer identification of varieties is diminishing making the market susceptible to cheap imports.
- Low margins with ware potatoes compared to other crops.
- Increasing market penetration of pasta and rice at the expense of potatoes.
- Supply chain and inspection capacity will be needed for expansion of seed sector.
- Lack of grower knowledge for specific seed production.
- High production costs for seed potatoes.
- Poor alternative markets for rejected seed /over-sizes.
- Small pool of suitable land for salad potato production.
- High production costs with relatively low premium for salad potatoes.
- Suitability of varieties for salad potatoes in Irish conditions unknown.
- Lack of developed market for rejects from salad potato production.
- Consumer reluctance to change source or variety type for chipping.
- Suitable land to achieve required specs, longer term storage capacity for chipping.
- Peeling/processing tends to be a low value market susceptible to cheap imports.

4.6.5 Actions Needed to Achieve the Potential

- Marketing strategy to promote potatoes and potato products and to provide orderly marketing structures that would reduce price volatility and stabilise supply (funded by production levy).
- Production research focused on: waste/cost reduction, yield, disease control and quality to improve competitiveness in all market sectors, coupled with associated technology transfer capacity.
- Land provision issues (suitability for production categories, costs, share farming models etc.) to be addressed.
- Promotion of seed production with pilot scheme and increased certification capacity.

  Breeding targets to strongly pursue salad varieties suitable for Irish production.

4.6.6 Legislative/Policy Changes required to Achieve Potential

- As access to grass leys is critical to produce quality potatoes it is critical that CAP reform does not inhibit rotational ploughing of long term grassland.
- Pesticide legislation should take into account the critical need for effective phytophtera control in our climate.
- The potential for future GM technology to reduce pesticide use should be recognised by facilitating trials on the technology.
- To prevent large retailers forcing price reduction, competition laws should be enforced and a ban on below-cost selling re-introduced.

4.7 Beet (Sugar and Fodder Beet)

Current Position

- Sugar beet production ceased in 2006. Previous production of 1.2 million tonnes was produced from 31,000 ha.
- Fodder beet is grown on 8,000 has annually for direct on-farm use (75%) or sale to other livestock farms (25%).
- During 2010 and 2011 two separate groups conducted feasibility studies to re-introduce sugar beet to Ireland.
  - Both studies aim to combine the manufacture of sugar (150,000 to 200,000 tonne/year) and bio-ethanol (5– 50 million litresl/year).
  - Beet raw material required would exceed 1 million tonnes.
  - Study 1:- 200,000 tonne/sugar and 5.6 million litres bio-ethanol using 1.8 million tonnes beet.
  - Study 2:- 154,000 tonne/sugar and 50 million litres of ethanol from 1 million tonnes beet and 56,000 tonne grain.
  - The domestic market for sugar is approximately 155,000 tonne/year.
  - The domestic demand for ethanol for inclusion in petrol by 2020 is estimated at 142 million litres/year.
  - The current obligation for biofuels is 4% with a plan to progressively increase to 10%.
- Farmer interest in the sugar beet industry remains strong. The current legal arrangements preclude the establishment of a sugar production facility in Ireland until after September 2015 at least.

4.7.1 Strengths

- Consistent high yields from long growing season.
- Excellent break crop in rotation: our land base is free from Rhizomania.
- Redistributes the workload for machinery and labour. Utilises farmers' production skills.
- Fodder beet has local market, strong core customer demand, excellent complimentary feed to silage.

4.7.2 Weaknesses

- While sugar beet yields are good, our sugar production costs can be high. Sugar from cane and from sugar beet production in warmer climates can be more competitive.
- High transport costs if production is not adjacent to processing facility.
- With fodder beet, labour, DM losses and costs associated with storing, handling, cleaning and feeding beet make it less attractive than concentrate feeds or maize/whole-crop for livestock producers.
- Absence of regular contracts and poorly defined quality standards for trading fodder beet continue to hamper development of contract production for livestock farmers.
- No current research programme.

4.7.3 Opportunities

Groups who have conducted feasibility studies for a sugar / bioethanol plant suggest a new sugar processing plant is viable and would give a return on investment over 15 years (dependent on sugar price assumptions). The impact on farm gate output is indicated in Table 4.8. The claimed benefits of such a facility include:

- estimated 200 direct and many more indirect jobs.
- utilisation of existing expertise of growers and engineers to grow and process beet.
- provision of ideal break-crop for crop producers.
- sustainable production, defined market/tonnage, strong markets for by-products.
- import substitution of sugar and ethanol, improved energy supply security.

- Fodder beet acreage will largely remain static (based on current demand) - opportunity if maize declines. Improved trading structures would help production.

Table 4.8 : Summary of Growth Opportunities for Beet

Opportunity	Market potential ('000 tonnes)	Farm gate value (million €)	Potential Area (ha)
Sugar / ethanol	1000 -1800	40 – 72	18,000-30,000

Note: *€40 million farm gate value 1 million tonnes beet @ €40/tonne;*

€72 million farm gate value 1.8 million tonnes beet @ €40/tonne

18,000 ha potential area 1 million tonnes beet @ 55 tonne/ha;

30,000 ha potential area 1.8 Million tonnes beet @ 60 tonne/ha

4.7.4 Threats

- Feasibility of sugar/ethanol plant depends on projected sugar price and abolition of sugar quotas. If quotas are not abolished, the EU commission would be likely to impose a levy on Ireland for quota re-instatement.
- Capital requirement needed (€350-€400 million) may be difficult with uncertain price and quota situation. An Ethanol plant would only be viable with significant Government support.
- Excellent land and grower skills required to average 55-70 tonnes/ha of beet.
- Other crops may prove more competitive depending on price relativity.
- Distance of field production from processing facility will be a factor.
- Emergence of non-food biofuels may threaten ethanol market.

4.7.5 Actions needed to Achieve the Potential

- Large scale investors must be sourced. Farmer investment schemes need to be developed.
- Support growers with agronomy research/advice when beet growing is recommenced.
- Develop recognised trading structures for fodder beet.

4.7.6 Legislative/Policy Changes required to Achieve Potential

- Abolition of existing quota system or a derogation to allow Irish production, but recognising the need for market stability mechanisms to encourage uptake.
- The commitment to 10% of transport fossil fuel to be replaced by renewable sources by 2020 should be maintained.
- National incentives to kick-start industry may be required.

4.8 Energy Crops (Solid Biomass)

While there are a range of potential energy crops that could be considered including alternative grasses for biomass production and crops for liquid fuel production, this analysis is restricted to the solid fuel energy crops willow (short rotation coppice) and miscanthus as these are currently best placed to meet future renewable heating fuel targets which are a key part of the government renewable energy commitments.

Current Position

- Approximately 3600 ha of miscanthus and 850 ha of willow planted for energy in the last 5 years.
- If harvested and utilised as heat, the annual production from this planting would have the capacity to heat just 8000 domestic homes which is about 8% of what is needed to meet 2020 renewable targets.
- While there is some market for willow as chip for industrial / large-building boilers, miscanthus markets have proven difficult
- Energy crops can be pelleted or briquetted, to facilitate subsequent combustion, or used directly in power stations, but these uses have not expanded because of poorly developed supply chains and unsatisfactory economics
- Establishment and production of some energy crops has not been satisfactory; this coupled with poorly developed markets and the slow rate of growth in times of high energy prices has greatly reduced prospective growers interest in these crops
- Incentive schemes have failed to effectively kick-start the industry to date

4.8.1 Strengths

- High energy prices likely to continue creating a potential market.
- Good yield potential in our climatic conditions (8 to 10 tonne DM/ha/annum).
- Excellent field-production research support in place.
- Potential user of various streams of organic waste capable of attracting a gate fee.
- Can be grown on a wide range of sites.
- Substitutes for imported energy improving balance of payments.
- Valuable carbon credit potential due to greenhouse gas saving potential.
- Economic activity in associated industry (boiler fit/service, fuel transport etc) would create economic activity and jobs.
- Policy targets (e.g. 12% heat requirement to come from renewables).

4.8.2 Weaknesses

- Poor markets for energy crop products and poorly developed supply chains.
- Significant post-harvest costs and logistics for all energy crops including some or all of: drying, transport, storage, processing (pelleting, briquetting) and delivery to end market with few fully developed systems in place.
- Lack of infrastructure from planting, but particularly from harvest, through to end uses i.e. combustion.
- Irish domestic heating systems not easily adaptable to energy crop utilisation (independent heating systems with low and variable heat requirement)
- Limited contracts that are available are not attractive compared to agricultural production.
- Many early adopters have been disappointed with the yield performance
- There is a no cohesive development strategy in place
- Competition between energy crops and agricultural production for the same land. However, the food vs fuel question is a quite complex one; the sustainability and carbon footprint of energy crop production can be positive

4.8.3 Opportunities

The growth opportunities presented in Table 4.9 are based on SEAI estimates of biomass heat fuel potential to meet our 16% renewable target by 2020. The market is additional to wood residues etc. This target would require the conversion of 2% of Ireland's grassland to energy crops. Waste streams from forestry and other renewable sources will supply the remainder of the 16% renewable target.

- In addition to the crop value of €63 million, the annual savings in fuel purchase cost to the end user compared to fossil fuel use are in the region of a further €100 million (although handling and burning costs will be more expensive).
- Carbon abatement from this quantity of energy crops is 822,597 tonnes CO_2 equivalent per year which in 2020 may be worth between €16 and €32 million. There is a case for more careful consideration of the value of the sustainability of energy crop production
- Outside of field production, the 2% land use change outlined would generate an estimated 393 permanent jobs and 139 construction/installation jobs
- Opportunity to contribute positively to balance of payments and to energy security

Table 4.9: Summary of Growth Opportunities for Energy Crops

Opportunity	Additional Market ('000 tonnes DM)	Additional Value (million €)	Additional Area (ha)
Energy crops	628	62.8	66,800

Based on energy crop price of €100/tonne DM

4.8.4 Threats

- Damage has been caused by failure of market development and associated infrastructure over recent years.
- High and volatile agricultural crop prices makes the case for commercial energy crops difficult.
- High level of risk with: high establishment costs; long investment period; inadequately developed infrastructure and markets, and uncertain prices.
- Very poor cash flow in early years – SRC willow only breaks even after second harvest (Year 7).
- Farmers concern about long term commitment, re-instatement costs, impact on land values and future CAP policy changes.
- Food versus fuel debate is real. Brand Ireland is not associated with energy crops although sustainability and carbon footprint credentials may be valuable.

4.8.5 Actions Needed to Achieve the Potential

- Production research capacity needs to be maintained to provide the necessary support for efficient production either in the short or longer term. It cannot be switched on or off as economics or industry support varies.
- An overall plan for the industry needs to be developed which will ultimately form the basis of decision making concerning legislative/policy changes outlined in the next section.
- A research/information procurement focus on post harvest technologies including drying, storage, supply chains, transport, processing technologies, boiler suitability etc coupled with economic analysis capability needs to be put in place to allow the industry to develop.
- Actions urgently needed to restore confidence in sector.

4.8.6 Legislative/Policy Changes to Achieve Potential

- A major co-ordinated review of all support schemes is essential. This should determine how best they would be altered to encourage development through support of production and necessary supply chains and end user demand. Items to consider may include:
  - Effective crop establishment support system.
  - Developing a stable multi-year commitment to all sectors of the energy crops scheme.
  - Consider rewarding growers for environmental credentials of biofuel crop production.
  - Future support schemes to address:
    - Fast turnaround of applications to allow planning of crop establishment.
    - Facilitation of both large and small scale projects.
  - Assistance for dealing with oversized short rotation coppice established in advance of market knowledge.

- Other measures to consider may include:
  - Measures to support production of lower cost planting material should be considered.
  - Support for conversion of large-building heating units to be considered.
  - Agri environmental schemes should reward energy crops for biodiversity etc.
  - Energy crops should be allowable as ecological focus areas in any CAP policy reform.
  - Grant support or low investment cost should be provided for Infrastructure such as specific field machinery and post harvest processing equipment should be made available.
  - Support should be available to help biomass boilers achieve lower emissions.

4.9 Maize

Current Position

- Maize has averaged 20,875 ha over the period 2008-2011, but the area declined to 19,000 ha in 2011 and dropped significantly again in 2012 (early estimates 11,000 ha) following a poor crop in 2011.
- Maize is grown almost entirely for whole crop silage production, and can produce a high value high energy feed.
- Increasingly maize has been grown under plastic mulches to extend the growing season, and hence productivity.

4.9.1 Strengths

- Maize can produce high yields of high quality animal feed, which when fed in conjunction with grass silage can support excellent animal performance.
- Because there is only one harvest per year at a different time to other harvests, and as it has a greater transport density than grass, maize can offer a less costly option for fodder production than grass on outlying land.
- The 'skill level' required to produce commercially worthwhile crops on favourable sites is more within the competence zone of grassland farmers than for whole-crop small grain cereals.
- It is easy to preserve as silage and does not normally produce effluent.

4.9.2 Weaknesses

- Maize can produce low yields and/or low quality feed, thereby producing extremely expensive feed. It is more variable (sensitive to prevailing weather) between years than most other crops currently grown on Irish farms.
- Production costs (land, fertilizer, fuel, sprays, machinery,) are high and impact on competitiveness as these costs increase over time.
- Maize is at the limits of its climatic suitability in Ireland and suffers significant yield loss in poor years, resulting in substantial production risk.
- Growing under a plastic mulch reduces seasonal variability but yield increases don't always cover the additional cost.
- There is still uncertainty about the optimum production approach in different regions; in particular the interaction between local climate, plastic mulch production and associated production system (sowing date, variety type etc).

- A significant proportion of maize is currently grown continuously, with potentially detrimental effects on soil structure through trafficking wet ground and pollution risk from repeated applications of slurry. The crop would benefit from being grown in rotation.
- Since the loss of atrazine, weed control has become more expensive and can prove particularly challenging where plastic mulch is used.
- Where minimum tillage or direct drilling is practised, the presence of maize in an arable rotation may increase the risk of fusarium head blight on cereals and mycotoxin production.
- Maize silage can be particularly prone to aerobic deterioration during feedout, leading to both quantitative and qualitative losses.

4.9.3 Opportunities

The opportunities in terms of additional market, value and extra area required are summarised in Table 4.10. These are potential but realistic figures. Whether they are achieved will depend primarily on the development effort by the industry, but also on unpredicted market changes and competition for land resources. This opportunity arises from:

- Expansion in beef and dairy as indicated in the FH2020 projections, while fuelled mainly by grass, where additional land is taken at a distance from the home farm it may be more efficient to produce additional fodder from maize or whole crop cereals than from grass. Maize is preferred by most livestock users. This could lead to an approximately 50% increase in maize production in line with the predicted 50% increase in milk production.
- Maize has the potential to be grown by specialist tillage farmers either on contract to or for sale to dairy/livestock producers.
- Maize is an effective bio-energy crop to grow for anaerobic digestion. If the REFIT tariff were increased to reflect the higher cost of this feedstock for energy purposes, there is an opportunity of expanding the maize area.

Table 4.10 : Summary of Growth Opportunities for Maize in Ireland

Opportunity	Additional Market ('000 tonnes)	Additional Value (million €)	Additional Area (ha)
Fodder	150 (DM)	28.5	10,000

Value estimated at €190/tonne DM

4.9.4 Threats

- Vulnerable to increasing input costs such as fertilizer, fuel, chemicals etc.
- Lack of focused breeding of varieties suitable for Irish climate.
- Greening in CAP reform may force rotation and decrease maize area.
- Unless the significant seasonal variability can be addressed through improved varieties the uncertainty of production will limit expansion.
- Lack of universal trading system to encourage contract production.

4.9.5 Actions Needed to Achieve the Potential

- Breeding/more intensive selection of varieties with improved suitability for our climate.
- Determination of the optimum production strategy (variety, sowing date, plastic mulch, management) for different regions of the country.
- A clear indication of production risk, (impacting on yield, quality and cost) needs to be developed for all potential growers in different climatic regions.
- A formal method for trading maize between tillage farmers and livestock producers is needed to establish market confidence. This requires:
  - Clear definition of crop 'quality'.
  - Means of estimating quality preferably prior to harvest.

4.9.6 Legislative/Policy Changes required to Achieve Potential

- The reform of the CAP must not force small producers to rotate crops as such a move is likely to drive them out of maize production.

4.10 By-Products

The previous sections have outlined potential areas for growth for a range of crops, and the potential increased revenue and job creation possible if the expansion is realised. On the whole, the revenues and jobs created are based on the exploitation of the primary marketable product. However, with a large number of tillage crops there are additional benefits, either to the tillage farmer or the agricultural industry as a whole, to be gained from the exploitation of by-products either from the growing of the crop or from its processing.

The benefits from exploiting these by-products are more difficult to quantify and in some instances separate from the production of the primary product. This section does not attempt to quantify the value of, or even identify, all of the potential by-products. Rather, the objective is to flag to the industry as a whole that, when seeking to exploit any of the opportunities identified, there could be significant additional benefits and revenue streams from exploiting these by-products.

Some of the more obvious examples of by-products with additional income potential include;

- Cereal straw for combustion or digestion for biofuel production.
- Barley and wheat straw for feeding.
- Beet tops as an additional feed for livestock.
- Beet Pulp for incorporation into rations.
- Oilseed rape meal, if pressed at home, as a protein replacement in rations.
- Distillers grains for livestock rations.
- Pea haulm for lamb feeding.

Chapter 5: Environmental Sustainability Considerations of Increased Crop Production

This report aims to set-out a vision and pathway for the development of the tillage sector in Ireland. As part of that process it is important to consider environmental issues from a number of perspectives. Firstly, it is important to identify any risks to the environment from the developments outlined in the plan. Secondly, it is important to identify any threats or opportunities arising from present or proposed future regulation that could impact on the sector. Finally, giving our current international reputation as a producer of 'green' environmentally friendly produce it is vital that this plan ensures that there is no threat to that reputation and that it includes an objective of improved sustainability and image.

In this section a SWOT analysis will be outlined in relation to the sustainability of the sector in the context of potential expansion.

5.1: Strengths

- Ireland's agricultural production has a positive image in terms of its environmental credentials. Environmental metrics, which Ireland scores well on, include water quality from a nutrient and chemical residue perspective, bio-diversity and soil protection.
- Irish tillage farmers produce high yields of good quality produce with ample opportunity for import substitution since Ireland is not self-sufficient in tillage products.
- These relatively high yields result in a lower emissions intensity when compared with lower yielding regions.
- The industry has the capacity to effectively and efficiently recycle nutrients from the intensive farming sector and from municipal sources.
- Soil loss levels are very low in comparison with most of our competitors.
- The diverse nature of our farming landscape with it's 'patchwork' of tillage and grassland is a significant advantage in maintaining biodiversity.

5.2: Weaknesses

- There is a potential in some scenarios for nutrient applied (particularly N) to crops to leach into ground and surface water at a higher rate than on permanent grassland.
- The scope of the sector to deliver environmental benefits thorough the development of a bio-fuel industry has been hampered by the lack of a consistent support framework
- There is potentially a greater challenge to maintain biodiversity where tillage is the pre-dominant land use in an area. However, this risk is much lower when compared with more intensive crop producing region in other countries.
- Tillage may result in higher soil losses than grassland farming, especially on heavier soils and with winter cropping of combinable crops, root-crops and potatoes.

5.3: Opportunities

There are opportunities for the tillage sector to contribute positively to the environment by:

- Reducing National GHG emissions through increases in the acreage of bio-energy crops.
- Reducing losses of nutrient to water through improved practices at farm level.
- Increasing returns from premium products based on a positive environmental image and effective marketing.
- Delivering a double dividend by efficiently utilising nutrient surpluses from other sectors in an environmentally sustainable way to boost output and income from the tillage sector.

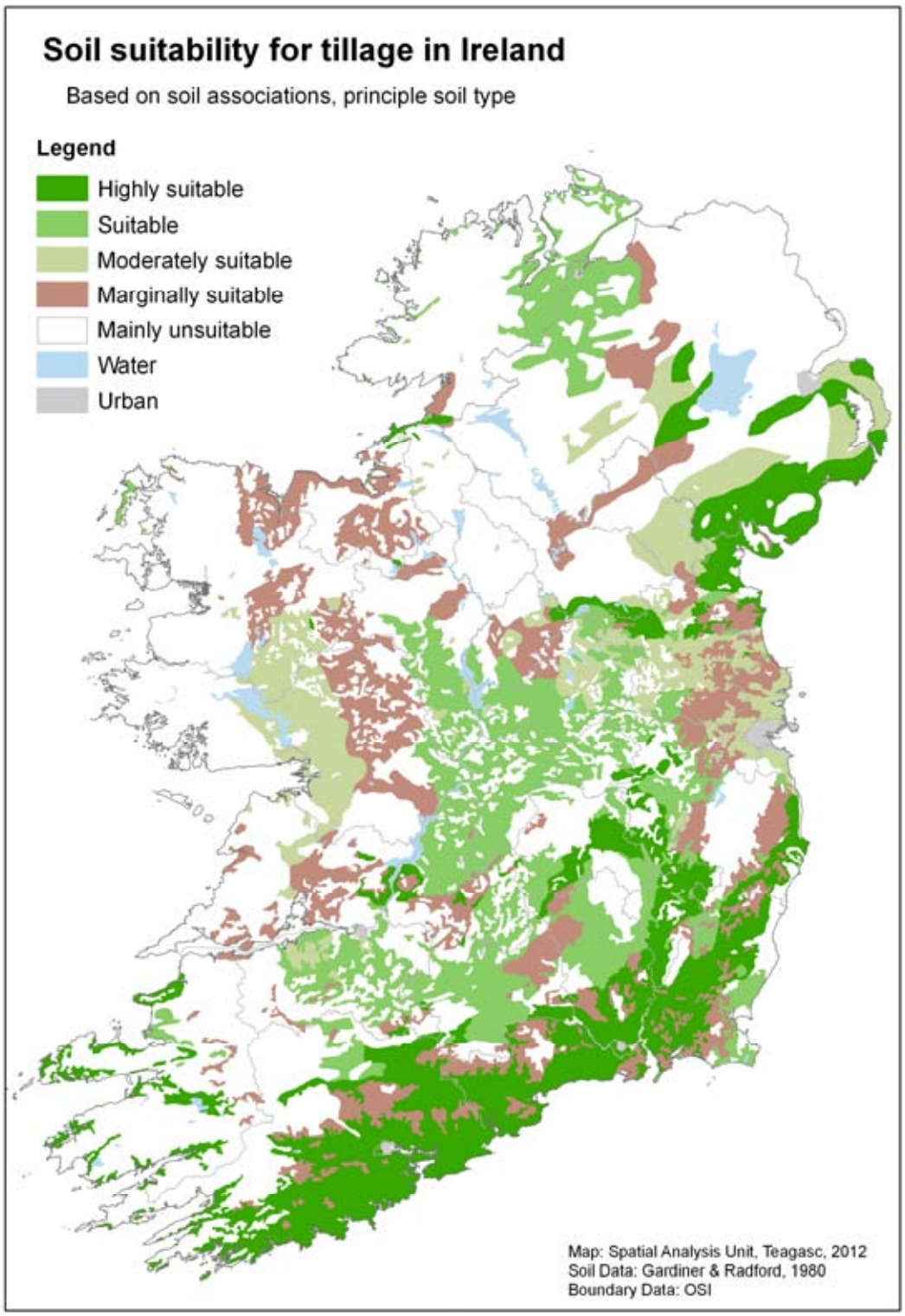
- Replacing imports of feed for the livestock sector and in so doing remove transport costs and carbon emissions and enhance the 'green' credentials of all sectors of Irish agriculture.
- Reducing GHG emissions and soil damage through the increased use of non-inversion establishment technologies.

5.4: Threats

- CAP reform greening measures have been identified in an EU Commission report as imposing a significant potential cost on the Irish tillage sector. The biggest threat emerges from the "Retention of Permanent Pasture" provision limiting the capability to plough areas currently in grassland for more than 5 years. If applied on a per farm basis, this could severely impact on the possibility of increasing tillage area and impact on the operations of mixed farmers operating grassland-tillage rotations. The "Crop diversification" measure could pose difficulties for a significant number of farmers and lead to loss of overall yield capacity or potential exit of some farmers from the sector.
- Potential for increased regulation of tillage farming to deal with catchment level water quality problems
- Less availability and increased regulation of pesticides.
- Potential increase in sediment loss due to increases in root-crops and winter crops if the necessary preventative measures are not implemented.
- Threats to bio-diversity from increased use of insecticides and potential removal of habitats.
- The Ecological Focus Areas measure (under the new CAP) proposed at 7% of cropping area (over and above existing habitats that are outside the land eligible for single farm payment) has the potential to reduce crop areas on some tillage farms

The expansion of the area under tillage crops can have both positive and negative environmental impacts. However, a concerted effort by all involved in the industry has the potential to ensure that positive environmental outcomes can be achieved.

Appendix 1


Soil suitability for tillage in Ireland
Based on soil associations, principle soil type
Legend
Highly suitable
Suitable
Moderately suitable
Marginally suitable
Mainly unsuitable
Water
Urban
Map: Spatial Analysis Unit, Teagasc, 2012
Soil Data: Gardiner & Radford, 1980
Boundary Data: OSI

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TILLAGE SECTOR DEVELOPMENT PLAN 2012