

NUFFIELD FARMING SCHOLARSHIPS AWARD 2002

**RISK MANAGEMENT FOR AGRICULTURAL
COMMODITY PRODUCERS IN THE EUROPEAN UNION**

By

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CONTENTS	PAGE
APPRECIATION	3
BACKGROUND AND INTRODUCTION	4
1.0 EXECUTIVE SUMMARY	
1.0 What are the main risks facing the agricultural producer?	5
1.2 Can risk in agriculture be minimised?	
1.3 What additional risk management strategies can be provided to EU agricultural producers?	6
1.4 Conclusion	9
1.5 Recommendations	10
2.0 WHAT IS RISK?	11
2.1 Internal business risk	11
2.1.1 Rationalisation of the Australian dairy industry	12
2.1.2 Personal challenge	14
2.1.3 Will I stay or will I go now?	15
2.1.4 Managing the Key Success Factors	17
2.2 External risks	20
2.2.1 Some common risks and strategies used to combat these risks	21
3.0 THE RISK OF SHORT TERM PRICE FLUCTUATIONS	28
3.1 How do commodity futures work?	28
3.2 Types of forward pricing strategies	30
3.2.1 The cash forward sale	30
3.2.2 A futures hedge	32
3.2.3 Options	33
3.2.4 What is the optimal amount of crop to hedge?	34
3.2.5 The dangers of forward selling	35
3.3 Future contracts for beef	
3.3.1 Gordon Hazard West Point Memphis USA	36
3.3.2 A futures market in beef in the EU?	37
3.4 Volatility in EU commodity markets	39
3.4.1 Measuring volatility	39
4.0 CROP INSURANCE	40
4.1 How insurance policies work	41
4.2 The US experience	42
4.3 Insurance case study in the EU	44
4.4 Continued product development in insurance products	45
5.0 CONCLUSIONS	46
6.0 RECOMMENDATIONS	47
7.0 CONTACTS	48
8.0 BIBLOGRAPHY	49

APPRECIATION

This Nuffield Scholarship was an honour especially as it provided a rare opportunity to research a topic that was both relevant and stimulating. One does not realise from the outset the experience a Nuffield can be. The study involves travelling to various countries while meeting people most knowledgeable on the relevant topic. The generosity shown by people from various walks of life forms a Nuffield study. They give freely of their time and ideas with the expectation that their contribution will be worthwhile. Thus it is the culmination of many different individuals views, observations and expectations that makes a Nuffield study so special.

Thus in order to appreciate a Nuffield Scholarship to its full extent the lucky individual must travel extensively, meet people in various walks of life, return and reflect on their study. Over this time period a different view of life is born within ones mind and a more inquiring and non-accepting attitude adapted towards the status quo. I would encourage people who wish to expand their view on life, and make a difference, to apply for a Nuffield Scholarship.

I would like to thank those individuals and organisations that made my Nuffield experience possible. The Nuffield Farming Scholarships Trust and their sponsors in Ireland the Irish Farmers Journal, the Irish Farmers Association, and FBD. My past and current employers Davy Stockbrokers and Appleton Capital Management for facilitating this study.

The movers and shakers of Irish Agriculture of the past and present that gave so freely of their time. Michael Murphy for his guidance and friendship. Porte Lionel in the Euronext in Paris. Ben George in the Chicago Board of Trade for his tremendous hospitality, Gordon Hazard in Westpoint, Memphis. Those in New Zealand that provided a home away from home. The Australian Nuffield members for their superb welcome, especially Brendon Smart and Max Jelbart. The Brazilian contributors to this study that gave an insight into a developing agricultural force. Those who gave of their time reviewing this thesis, especially Thomas Clinton, Joe Rea and Paddy O'Keeffe. The participation of those outside the agricultural arena who showed their interest in the business of farming and its future direction.

My parents Donal & Breeda, and sisters Mirinda & Janet for their encouragement and tolerance of my absence. My girlfriend Michelle for her support and enthusiasm for the future.

Thanks

The views expressed in this report are entirely my own and do not necessarily represent the views of the Nuffield Farming Scholarships Trust, my sponsors or any other sponsoring body.

BACKGROUND

Thomas Horgan graduated from University College Cork with a BSc in Food Business before returning in 1997 to farm the family dairy farm of 250 acres with his parents. In 1999 he employed a farm manager and worked with Davy Stockbrokers in Dublin as a Stockbroker. In 2003 he joined a hedge fund company, Appleton Capital Management, in Dublin where he markets their Hedge Funds to institutional and financial advisors across Europe. Thomas is currently studying the Series 3 commodity broking exams and the Certified Financial Analyst certification. The family farm is run in conjunction with his parents and farm manager.

Thomas travelled to the United States, Brazil, New Zealand, Australia, and Tasmania during the course of his Nuffield travels.

INTRODUCTION

Up to recently there has been little need for this study as the European farmer was protected by the commodity price support mechanisms of the Common Agricultural Policy. However in future the ordinary farmer in Europe will have no idea what price they will achieve for their product until the point of sale. There will be increased volatility in commodity prices as a consequence of decreased protectionism. The EU farmer will need risk management tools to manage this increased level of volatility. Otherwise they will go out of business due to circumstances outside their control.

The intention of this Nuffield study was to determine to what extent the risks involved in farming in this new environment could be controlled or protected against. There are many risks associated with producing an agricultural commodity outside of commodity price volatility, but this was identified as the main risk going forward. Every risk could not possibly be covered in this study, however, an attempt was made to cover the principal recurring risks.

Recommendations are made as to how individuals can identify and address the risks involved in farming now and in the future. Improvements to existing EU risk-management techniques are then proposed to address the challenge facing farmers over the next decade.

1.0 EXECUTIVE SUMMARY

The aim of this Nuffield study was to examine the current tools used to control risk in agriculture around the world. The potential to apply these tools to agriculture in Europe was then explored and recommendations derived from these observations.

Key objectives in this study were:

1. To identify the main risk events facing the agricultural commodity producer
2. To establish if these events could be protected against
3. To outline how additional risk management structures could be provided for EU agricultural commodity producers

The purpose of risk management tools is to help participants avoid catastrophic events that put their business at risk. Excessive price commodity swings can close an unprotected farm business.

The outcome of Fischler's mid-term review will continue to weaken the current EU commodity price support mechanism. This price insurance policy for EU farmers is under further pressure in the current Doha round of World Trade Organisation talks. Pressure is being exerted to reduce or abolish export subsidies while allowing farmers from developing countries better access to EU markets. Further inevitable liberalisation of world agricultural markets will expose EU farmers to increased commodity price volatility.

In the US dairy industry price swings of more than 115 percent (high/low) over the course of a year were unheard of during the 60s, 70s and 80s under a protectionist regime. In the 1990s, typical price swings were more like 130 percent and in years of supply shocks, price movements of 150 percent were observed. It is likely the price volatility of the 1990s in the US will be mirrored in the EU commodity market in the decades ahead.

This brings into focus the need for risk management strategies going forward.

1.1 What are the main risks facing the agricultural producer?

There are many risks associated with farming. All cannot be guarded against. However if the main risks can be controlled the odds of a successful outcome for the farmer increases.

The risks most commonly identified in this study are:

1. The risk of adverse commodity price movements
2. The risk of damaging climatic events
3. The risk of adverse currency movements
4. The risk of inefficient production within the farm gate
5. The risk of family members pursuing interests outside of farming
6. The risk of being in the wrong business at the wrong time

The risk of adverse commodity price movements was identified as the biggest risk in this study. This is a factor that is entirely outside ones control and in the future will become a real issue for European farmers as the level of agricultural support is cut.

1.2 Can risk in agriculture be minimised?

It was found in the course of this study that all manner of risks can be protected against to some extent. However a trade-off will always exist between the likelihood of an event occurring and the cost of protecting oneself against this possible outcome. An individual should first identify the risks their business is exposed to and then take reasonable steps to protect against those risks.

Point of view

'Risk comes from not knowing what you are doing.'

Warren Buffet CEO Berkshire Hathaway

The Worlds greatest investor Warren Buffet of Berkshire Hathaway in the US evaluates opportunities on a relative basis in terms of the probability of an outcome occurring. The level of risk incurred with each opportunity is then examined. An informed decision can only be made on a risk-adjusted basis. For instance an opportunity may be attractive (in terms of potential return) but the level of risk (in terms of loss of capital) incurred too high. Sounds easy but in practice how many of us evaluate opportunities on such a basis?

One seeking to reduce risk should protect oneself against events that are most likely to occur and are most critical to the business. Each individual will have a different view on what risks are greatest, depending on their personal situation and experience.

1.3 What additional risk management strategies can be provided to EU agricultural producers?

Four key areas were identified.

(a) Management practices

The range of efficiencies achieved in farm businesses is wide. There are many factors that influence the bottom line of a farm business. Structural issues may be costly due to fragmented holdings. Or perhaps the labour cost is excessive for the size of a business. A farm business may not be of sufficient scale. Handling and building facilities may be inadequate thus affecting the quality of output.

Good planning and clarity in the direction of a business is essential. In a low margin environment the risk that a business will fail is increased if exposed to inefficient management practices. Best practice needs to be continuously identified, promoted and producers benchmarked against these targets.

Point of view

'The difference between a good farmer and a poor farmer is speed of action. In challenging environmental locations four hours is the difference between when it should have been done, to when it can't.'

Thomas Clinton (Ex-IFA president)

(b) The development of a EU futures market

The majority of EU agricultural producers will not know what price they will achieve for their product at the time of making their production decision in the near future. Through the creation of a EU futures market this situation can be managed.

The first purpose of a futures market is price discovery, the second the facilitation of the transfer of risk. Buyers and sellers come together and establish the market price for a given quantity and quality of a commodity to be delivered at a given point of time in the future. If the future demand for a commodity is weak the price offered in the futures market will be weak.

An efficient futures market allows a producer to discover in advance the price that can be achieved for their produce. This price is established months in advance of actual delivery. Decisions can be made during this time period on the basis of this information. Inputs can be managed to give the optimum financial result. Production decisions can be tailored to suit market demand. Finances can be planned and overall levels of farm and processor risk reduced.

Traditionally the CAP has provided a price base for EU agricultural products thus eliminating the need for market price risk management tools. In recent times trade liberalisation pressures like the legacy of Agenda 2000, the WTO negotiations and EU enlargement, have forced policy-makers to favour less market-distorting methods. Partial or full de-coupling of financial aid from production is the first step. Whatever the eventual details it is clear that the level of commodity prices will become more volatile as world market price levels are attained and stocks diminish. Thus a need arises for market strategies to protect the producer from price volatility.

Point of view

'We Australian farmers are delighted with the Common Agricultural Policy. It makes the European farmer lazy, complacent and curtails production. That allows us to take the new markets.'

Brendon Smart (Cereal Farmer/Chairman Australian Nuffield Organisation)

There are barriers that currently limit the potential for the formation of a futures market in Europe. For instance the existing structure of the EU beef export market is characterised by a small number of exporters who act independently. The market in which this beef is sold and the price achieved by these exporters is influenced by two main factors. Firstly since the BSE crisis EU beef markets have to some extent renationalised thus creating a barrier to free trade for EU beef products. Secondly import regimes dictate the level of competition and quantities of beef allowed into the EU. Over time import regimes will be relaxed and the EU beef market will face tough price competition, thus challenging consumer loyalty.

The creation of a EU futures market will depend on three factors:

1. The marketing efforts that accompany this inflow of cheap beef and the subsequent extent of the displacement of higher cost local beef
2. The willingness of EU market exporters to work together
3. EU consumer loyalty

(c) Insurance products

An opportunity exists to expand the range of insurance products available to protect specialist growers and producers from damaging climatic events. Insurance policies organised on a EU basis with the cost to the agricultural producer subsidised by the EU is a viable option. A precedent exists in the United States where Government and private enterprise work in co-operation and provide beneficial insurance products to farmers. Furthermore this type of aid does not interfere or distort the market price achieved by the producer for their product. As a result this type of financial assistance comes outside the scope of WTO talks.

The United States Department of Agriculture has summarized that \$18 billion in total losses were paid to agriculture producers from 1981 to 1996. Almost \$13 billion of that total was covered by Multiple Peril Crop Insurance and \$5 billion was covered by private crop hail insurance programmes. The level of coverage has further increased since 1996.

Other insurance products that merit consideration include interest rate protection products or deferred tax savings accounts.

Point of view

'Most people don't want to be different. People have the mentality, 'As long as we all go down together then that's ok, or if we go down less than the next person then that's ok. That's nonsense!'

Chris Reilly (Fund Manager Bank of Ireland Asset Management)

(d) Marketing contracts

In America when farmers talk of selling their agricultural product the term they use is to 'market' their produce. It is all about having a market to buy the commodity once it is produced. The most successful entrepreneurs are those that anticipate changes in markets and produce the product that the market demands before the competition adapts.

Markets can be secured before the product is produced and the quality, quantity and timing of production agreed through the use of marketing contracts. If this is done one has entered a marketing contract. There is scope in Europe to expand the use of marketing contracts. Individual producers or those representing producer groups can secure niche markets by offering consistent quality, quantity, while perhaps establishing a brand for their product over time.

A mutually beneficial approach must be adapted for all parties involved in marketing contracts. Co-operatives have a role to play in organising marketing contracts that pass the value achieved down to the producer on a transparent and equitable basis. Considerable premiums can be achieved for products slightly modified for specific niche markets. The simplest type of futures contract is where a buyer and seller come together in advance and agree a marketing contract.

1.4 CONCLUSION

The Common Agricultural Policy has bred a level of complacency since its inception. It is sometimes felt a market that offers a decent price for a given commodity is deserved. However markets are vibrant. Tastes change, eating habits change and demand changes. European competitors must develop, grow and learn to compete. World transportation costs are decreasing from year to year and technologies in preserving food during transportation advance. Trade liberalisation pressures continue to increase. The result is a competitive agricultural market on a world scale.

This changing economic landscape poses threats but also offers opportunities. New and expanding markets are open to European produce as well as foreign produce. European producers may not be able to compete on the cost commodity level but are able to compete on the value-added level. A perfect example of this is the sale of top quality EU cheese and butter products into the US market.

Social agendas that encourage the vibrancy of rural economies are to be commended. However these should be differentiated from, and avoid interference in, the business of farming. When the social agenda is allowed to interfere with the business of farming an uncompetitive industry is created. A clear strategy going forward in agriculture will only be sustainable if the strategy is based on economic fundamentals. Otherwise the strategy will be continuously changed as economic pressures are exerted. Economic decisions that are made on the previous economic rationale will suddenly be made defunct.

Within this vibrant agricultural economic landscape there is a role for risk management instruments, available in the US and around the world, to be considered to help manage the risk of farming for the benefit of all participants.

1.5 Recommendations

1. The creation of a futures market in the EU that allows participants in the food industry to hedge their price and supply risk through the futures market. Established quality parameters will serve as market guidelines for producers as well as communicating the demand of consumers. The operation of this futures market at a European level will be required for it to achieve the necessary scale to operate efficiently. A working body comprised of producer and processor interests, EU policy makers and commodity market exchange representatives should be formed to progress this area.
2. The development and promotion of risk management strategies for agricultural producers is necessary. The formation of a task force between representatives of the insurance industry and agricultural producers, supported by EU involvement, is required to develop strategies to help farmers manage their risk in an EU agricultural environment increasingly open to world trade. The price protection policies of the past will gradually be unwound but that does not mean assistance cannot be provided in other ways to the farmer.
3. Entrepreneurship should be supported to a greater extent. Each agricultural producer who is running a farm business has the skills to run a business in a different economic sector. The same principles apply. It is quite possible that this new industry will be economically more rewarding than farming. Farm organisations and government agencies supporting agriculture need to widen their brief.
4. Consumers ultimately drive the food market. Producers will have to adapt to changing tastes and market demands. In time markets will be driven by future contracts created to serve many specialist markets. In an Irish context the signs are already there with forward contracts for under 12 month beef, grain fed beef, grain fed lamb, off-season lamb, light pigs, organic produce, etc. These future contracts would best operate on a recognised exchange with established quality parameters and clearly defined rules for the benefit of all participants.

2.0 What is risk?

Risk is defined as a hazard or a threat. There are two aspects to risk. The first is the likelihood of the event occurring. The second is the importance this event would have on a given situation.

At a fundamental level a business produces goods that supply a market. Its success will be dependent on the performance of the business and the demand for the product by the market. If the demand for a product changes, then the product supplied must change to match the changed demand. Otherwise prices will fall and the business will fall on hard times. A business must be adaptive to survive.

Risk is an unavoidable element in the business of agriculture. Production can vary widely from year to year due to unforeseen weather and market conditions, causing wide swings in commodity prices. Farmers face an ever-changing landscape of weather, prices, yields, government policies, global competition, interest rate, currency fluctuations, and other factors that affect their financial returns and overall welfare. But risk, while inevitable, is often manageable. However instruments to manage risk are more widely available in other parts of the world than in the EU.

Mainstream agriculture is a commodity business. It is difficult to differentiate potatoes produced by one farmer with those of another. Farmers are price takers. They are price takers as supply can often exceed demand and they have a commodity they can do little with to differentiate from their competitors. As a result once a production decision has been reached the only variable is in the efficiency of the production of the product.

To differentiate a commodity product value must be added to it. Effectively an investment must be made to obtain a higher price.

2.1 Internal business risk

There are many types of internal risks to a business that include:

1. Inefficient practices
2. Low capital investment
3. Slow adaptation of new technology
4. Inheritance/succession issues
5. Lack of direction

Some of these issues are long-term, others short-term, but all will affect a business if not properly dealt with. Some internal risks can be logically dealt with. For instance at critical harvest or planting times the use of contractors is widely practised. The trend towards specialisation on farms serves to increase an individual farmers exposure to risk factors.

The process for successful management of a farm business and the risks associated with it (as defined by Parker 1996) are:

- Know where you want to be
- Identify the best strategy and tactics to achieve this
- Implement the plans with precision
- Control outcomes through regular monitoring and corrective action when required

The underlying principles for the farm business, with respect to the management process are:

- Use equity effectively
- Avoid over-capitalisation (particularly in machinery and equipment)
- Control costs but not to a level that compromises profit
- Retain a degree of spending flexibility
- Maintain ethical business relationships through regular communication and proper conduct.

Both the principles and process can largely be addressed by formal budgeting of income and expenditure. Up-to-date farm budgets and financial statements are a necessity to make informed financial decisions. ‘What if’ scenarios will serve to demonstrate the potential risks a business will face under difficult circumstances. A cash flow budget is the most useful tool in running and monitoring the performance of a business.

A person needs to know:

- Where am I financially?
- What are my ambitions and interests?
- Where am I going?
- How will I get there?

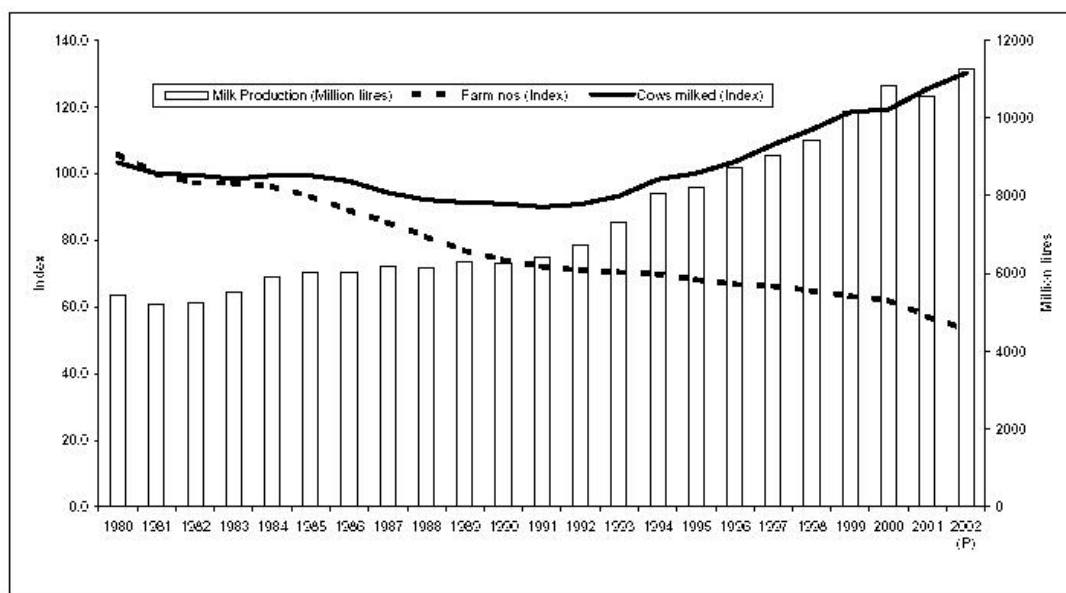
However if a business is not based on sound economic fundamentals ultimately the business will fail. That is why each farmer should evaluate their business and make informed decisions before available options are reduced over time.

2.1.1 Case Study – Rationalisation of the Australian dairy industry

In Australia the dairy industry is the third largest rural industry behind beef and wheat. It was clear in the late 1980s to both industry and government that Australian dairying would have to become more competitive if it was to survive and prosper. In 1986 the Crean Plan was implemented by linking milk processor returns to 44% above world parity prices, while gradually reducing this support to 22% by 1992. The scheme directly linked company returns to world prices. As a result, the farm gate price that firms could pay for manufacturing milk now depended on their individual marketing efforts.

At the same time, the Plan allowed for a phased reduction in domestic support so as to promote industry rationalisation. This Plan was extended as the Domestic Market Support scheme (DMS) and in effect reduced domestic support to 10% above import parity prices. Liquid milk states, NSW and Queensland, transferred money from liquid milk returns to provide support to manufacturing states like Victoria and Tasmania. These arrangements concluded on 30 June 2000.

Australia's production increased both in volume and value terms over the past ten years as a result of these measures. Between 1980 and 2002, the value of Australian dairy exports increased by more than 250 percent in real terms.



*Australian milk production versus indices of farm and cow numbers
(Source: 2002 Australian Agribusiness Congress – Sydney November 12th 2002)*

Characteristics of the Australian dairy industry include:

- • Fewer producers
- • High production levels
- • More efficient farms
- • More professional farm business management practices

Nearly all (98%) of Australian farms are family concerns. There are currently 11,000 dairy farms, a decline from approximately 22,000 in 1980. Average herd size has increased from 85 cows in 1980 to 214 in 2002. Australia's annual production in 2000/01 increased to 10.85 billion litres, from a level of 6 billion litres in 1990. Milk production in Victoria increased by 70% over the same period.

A task force was set up in Victoria during the time this change was being implemented to examine the effect this process had on farmers' lives. Max Jelbart,

who farms a 900 dairy herd near Melbourne, was part of this task force and some of their observations at the time are detailed below.

2.1.2 Personal challenge

It is important that a person's challenges in life match their skills. A happy and interesting life is the result. If one's challenges are low and skills are high, then the result is boredom. If there are lots of challenges and one's skills are low the result is anxiety. If a farmer does not know where he is going with his business then he will be worried and anxious. The solution is improving one's skills and then seeking new challenges to match these skills.

It is the responsibility of each individual to up-skill to ensure one is capable of meeting any challenges that occur in life with confidence and happiness. Much anxiety and worry is apparent in the EU among the farming community.

With the exception of catastrophic events the future of agriculture in the EU is known. It will be legislatively constraining and economically challenging. Strategies to best manage this future should be devised and embraced.

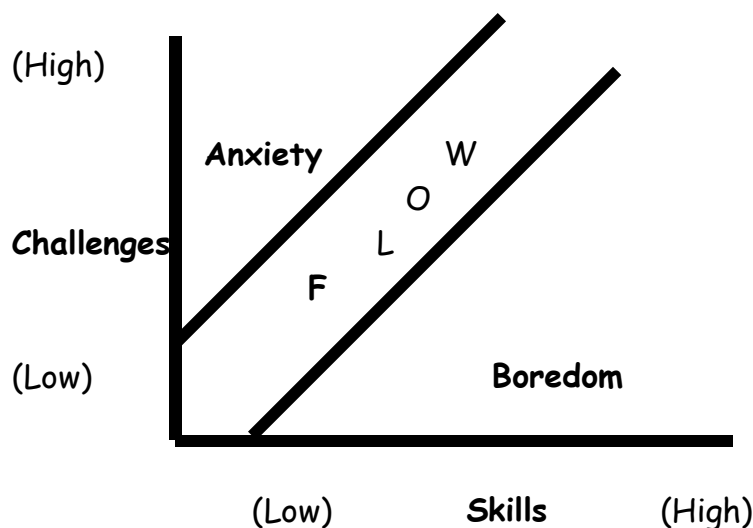
Inaction is not an option.

With every business there are challenges. Fashions come and go. Markets change and competitors move up the value chain. Little is static in business.

Point of view

'IAWS plc now gets 70% of our operating profit from a business we were not in five years ago'.

Philip Lynch (CEO IAWS plc group)



The effect of position in the skills and challenges matrix on mental state. (from Mihaly Csikszentmihalyi .1992. In *Flow: The psychology of happiness* p74).

Matching a person's challenge to their level of skills can be demonstrated by the graph above. If the challenge is too much for the skills of an individual the result is anxiety. If the challenge is too little for the skills of an individual the result is boredom. Once a medium is achieved then happiness can be achieved.

2.1.3 Will I stay or will I go now?

The first question a farmer has to ask when reviewing his farm business is 'Does my farm business have a financial future?' This is an emotional question and each farmer will come to a different conclusion depending on the scale and financial health of their current operation.

If a business is not on a sound economic footing then risk management tools will be of limited assistance. In fact they will be a short-term added cost. Thus the first task any farm operator must undertake is to put their business on a sound economic footing and only then undertake a suitable risk management strategy. Using a risk management strategy does not necessarily avoid risk altogether. It instead balances risk against return and makes it consistent with a farm operator's acceptable level of risk.

It is important to note that farms vary in their ability to weather external or internal shocks so no one strategy will suit every situation. Consider a farm that is highly leveraged, is producing one commodity, and lacks off-farm income to another that is diversified, is not dependent on the farm to provide the owners with an income, and produces a niche crop.

The limiting factor in Irish dairy operations at present is the restrictive milk quota situation. Dairy operators are not allowed to expand due to a rationale that dates back to an era of protectionism. Margin pressures will soon force change. However the longer change is delayed the less competitive the Irish dairy scene will be on a world scale.

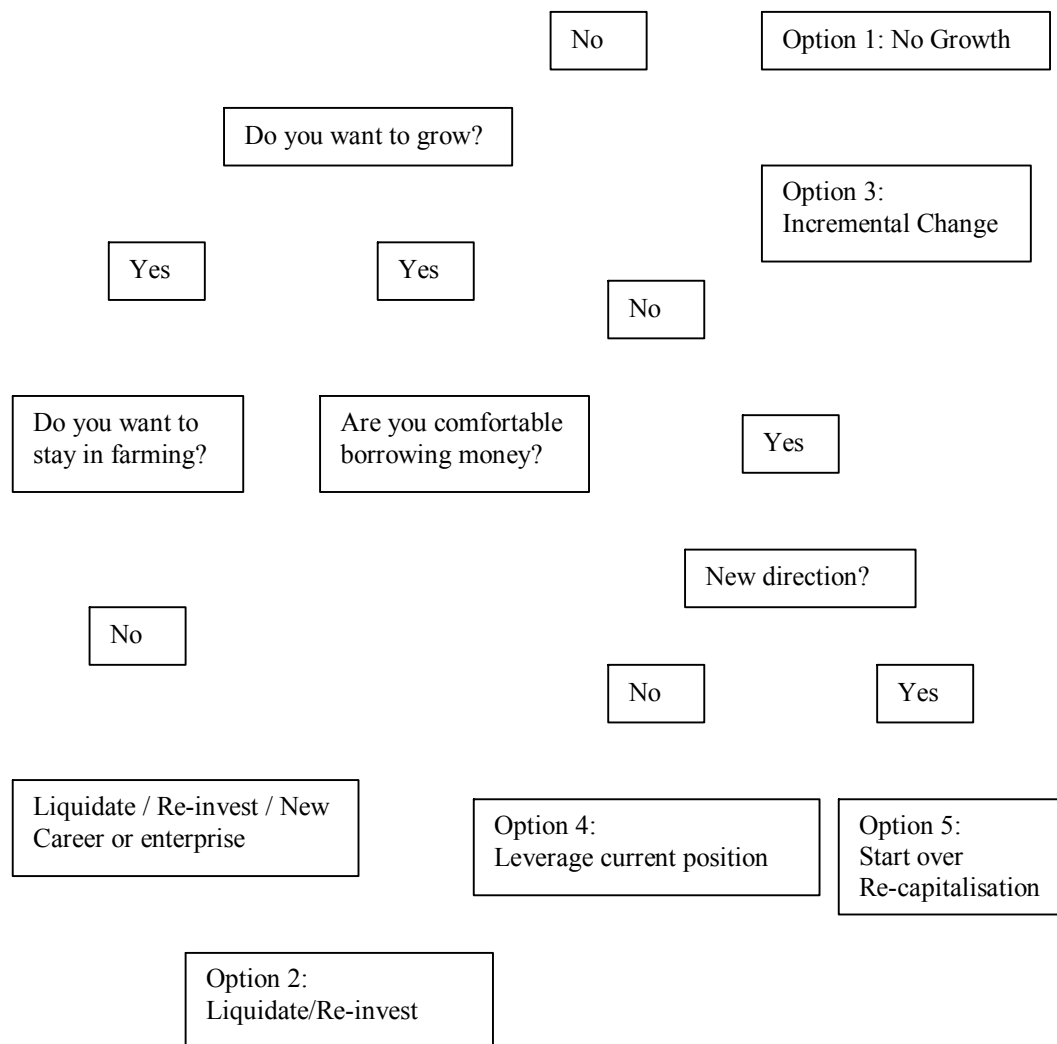
There are a number of scenarios to be found in the farming community that include the following.

- The farmer that does not want to stay in farming
- The farmer whose family does not want to stay in farming
- The farmer that does not want to grow
- The farmer that does not want to increase their level of debt, but wants to preserve the equity they have in the business
- The farmer that wants to leverage his current position to grow
- The farmer that wants to start all over and build anew with a different focus

Point of view

'Managers do things right, leaders do the right things'
Warren Bennis

The choices facing each individual can be represented in the following flow chart.



The choices facing the farm business in a challenging economic environment

What are the constraints?

- Description of farm - the physical factors of the farm for the scenario in question
- Is the farm of sufficient scale to allow expansion?
- Present EU constraints/limitations or threats
- What factors may limit performance of the business for the respective scenario?
- The opportunities available
- The potential benefits of each decision path to improve the business
- Resources needed
- The managerial and physical resources that are needed to facilitate each scenario
- The possibility of co-operating with others to achieve your goals

Time should be spent considering what strategy is going to be adapted in the years ahead. The consequences of each choice has to be considered including the consequences of inaction. The risk of the business failing will be much reduced if these steps are taken.

Family involvement in the farm business is an emotional issue that cannot be quantified or at times planned for. An open mind on the level of involvement of family members and their career paths is important. Family members need the freedom to pursue their own path in life. The level of involvement the farm business will play in that future will be for each individual to decide.

2.1.4 Managing the Key Success Factors

There are key success factors in every business. These should be identified. For instance on a cereal farm an example of a key success factor would be the timing of the planting of seed. On a dairy farm it would be the successful implementation of an AI programme. Once these key success factors are identified responsibility for these tasks should be allocated and a planned approach adapted. A business can be put at risk if these key success factors are not properly performed.

The allocation of tasks on a farm is often done on an ad-hoc basis. In competitive economic times a simple task like the omission of maintaining a vital piece of machinery can put the business at risk in the event of a subsequent breakdown and resulting cost.

Examination of best practice in other industries can aid our working habits in the agricultural industry. In the engineering sector for instance preventative maintenance is a widely implemented field. Preventative maintenance involves performing regular inspections to identify and thus prevent problems from occurring. The result of a successful programme extends the life of facilities and equipment, and minimises unscheduled downtime. This system can be easily adapted to farming to assist in achieving optimum results.

Monitoring Key Success Factors

On my Nuffield trip I met Australian farmer Brendon Smart who developed a system to allocate responsibility and monitor tasks on his 8,000 acre cereal operation. He titled this system his 'Quality Management Programme' and credited his success to its proper implementation. While not directly relevant to the purpose of this study I have included a description of his method as I feel it may be of benefit to individuals wishing to increase scale in farming.

Point of view

'If you're not playing a big enough game, you'll screw up the game you're playing just to give yourself something to do'.

Anonymous

This system added clarity to his business and as the business grew he was able to allow his employees to step forward and assume increasing levels of responsibility. Responsibility for tasks was allocated to a team member only on mutual agreement with Brendon. Responsibility for a task was always shared. Two people were at all times responsible for making a decision on the task. However one person was responsible for ensuring action was taken on the decision. That person did not have to do the task. But he/she did have to ensure it got done.

Employees signed off on the document at the end of a consultative process and these new responsibilities were then part of their job description. Every six months the programme was revisited and responsibilities re-allocated if desired. The Quality Management programme was posted in a public area on the farm and employees regularly visited it and checked to ensure all their tasks were completed.

The result of the successful implementation and maintenance of this programme was Brendon spent his time, not managing the existing business, but evaluating opportunities and deciding on the strategy and future direction of the business.

Brendon Smart's 'Quality Management Programme' is demonstrated below. The implementation of such a programme on farms would add to the clarity and organisation that can be achieved. I would like to thank Brendon for permission to include his programme in this Nuffield study.

Quality Management Programme

Task	Subset of Task	RESPONSIBILITY FOR		
		Decision		Action
Irrigation	Maintenance	IM	DS	IM
	Operation	IM	DS	IM
Weed & Pest	Recommendations	Consultants	ALL	IM
Livestock	Spraying	IM	DS	IM
	Feeding	AN	BR	AN
	Husbandry	BR	AN	BR
	Paddock Shifts	BR	AN	BR
	Buying Selling	BR	DS	BR
	Stock Water	AN	BR	AN
	Planning	DS / ALL	Consultants	DS
Cropping	Cropping	DS	IM	DS
	Fodder	BR	DS	BR
Farm Maintenance	Fertilising	DS	BS	DS
	Harvesting	BR	AN	BR
	Fodder	BS	ALL	BS
	Sales	DS	ALL	DS
	Physical	AN	IM	AN
	Fencing / Misc Vermin	ALL	IM	IM
	Structural Improvements	IM	AN	IM
	Unimog/ Hitachi/ Merc 2222 /	DS	ALL	DS
	JD9610/ JD 8100 / Kawa 2	BR	BR	BR
	wheel/JD4040/Lcruiser	AN		IM
	Hilux / Kawa 4 wheel / Trojan	IM		DS
	Workshop	DS		IM
	Farm Appearance	IM		
	Misc Machinery, slasher, augers etc			
Please note: Day to day maintenance of all plant i.e. coolant, lubricant, and oil checks is the responsibility of the operator				
Management	Meetings	DS	ALL	DS
	Holidays	DS	ALL	DS
	Professional Development	BR	ALL	BR
	Whole Farm Plan	DS	ALL	DS
	Occupational Health and Safety	IM	ALL	IM
	Pictorial Record	DS	ALL	DS

The primary responsibility for decisions rests with the first named party. Where other parties are named a process of consultation is desirable. The action of each decision, being either physical or delegation, is the sole responsibility of the final named party.
 Document Update: 26-3-94; 2-11-94; 7-3-95; 12-9-95; 1-7-96; 20-6-97; 13-10-97; 22-6-98; 18-4-99; 25-10-2000 ; 11-2-2002

2.2 External risks

External risks are those factors that serve as a hazard to the business outside the farm gate. EU regulations are a prime example. They can change the economics and future prospects of a business overnight. The weather is another external risk as is global warming. Some of the most common external hazards are listed below.

The external risks of a business are

- Fluctuating commodity prices
- Weather risk
- Production variability
- Rising costs
- Excessive regulation
- Decreasing market demand
- Changing tastes
- Lower cost or more efficient competitors
- Changes in import regimes
- Currency fluctuations
- Interest rate fluctuations

Everybody will have different views as to what risk means to them. If an event occurred in the recent past, like a significant fluctuation in the price of a commodity, an individual that was badly affected by such an event may consider the likelihood of this event recurring to be the main risk. However an individual that experienced a large storm in the past that caused excessive damage may view this as the main business risk.

The preferred risk management strategy may also vary because of reasons such as

- The farmers' attitude towards risk
- An operator's overall level of wealth
- Other management objectives, such as profit maximization or enterprise growth

Defining a farm's risk environment

The farm's principal external risk lies in the uncertainty of the revenue generated by the production process. Farm revenue uncertainty is principally a function of the uncertainty of yield and price as well as the relationship between price and yield.

The fundamentals for making good risk management choices are:

1. Identifying the relevant risks for the farm in question
2. Knowing what risks can be protected against and identifying the various tools available to address these risks
3. Selecting the strategy or combination of strategies that will provide the protection that best suits the farm's and the operator's individual circumstances

2.2.1 Some common risks and strategies used to combat these risks

A number of common risks are outlined below and appropriate strategies to address these risks.

- 1) Risk: Margin pressure
Response: Vertical integration

Vertical Integration generally decreases the risk associated with the quantity and quality of inputs (or outputs) produced. The vertically integrated firm retains ownership and control of a commodity across two or more levels of activity. An example of an enterprise visited in the course of this Nuffield study that employed this technique was Harris Ranch that is located between Los Angeles and San Francisco. Harris Ranch is a 100,000 cattle feedlot that owns the feedlot, the cattle, the processing plant and the brand under which the beef is marketed. In the EU farmers have traditionally addressed this risk through the formation of co-operatives. The recent trend in Ireland from a co-operative status to a plc route would appear to increase the risk of margin pressure on farmers over the longer term.

- 2) Risk: Market access
Response: Production contracts

Production contracts guarantee market access, improve efficiency, stabilise income, ensure access to capital, and provide lower start-up costs and income risk. Production contracts usually detail the inputs to be used by the producer, the quality and quantity of the commodity to be delivered, and the compensation to be paid to the producer. The contractor typically provides and retains ownership of the commodity (usually livestock) and has considerable control over the production process. Production contracts are more prevalent in the livestock industry.

For contractors (primarily processors and packers), these arrangements assure

- (a) A ready supply of uniform, high-quality farm products
- (b) Ease inventory management problems

On the downside, production contracting can limit the entrepreneurial capacity of growers, and contracts can be terminated on short notice. A production contract details the supply of the necessary production inputs as well as the quality and quantity of a particular commodity and the compensation due to the farmer for services rendered. Under livestock production contracts, the farmer is paid to provide housing and care for the animals until they are ready for market, but the contractor actually owns the animals.

- 3) Risk: Adverse price movements
Response: Marketing contracts/hedging/options

The following risk management strategies can help mitigate the effects of swings in supply, demand, and fluctuating commodity prices so that farm business returns can be closer to expectations.

(a) Marketing contracts

Marketing contracts set a price (or pricing mechanism), quality requirements, and delivery date for a commodity before harvest or before the commodity is ready to be marketed.

The grower generally retains ownership of the commodity until delivery and makes management decisions. Farmers generally are advised to forward price less than 100 percent of their expected crop until yields are well assured to avoid a shortfall that would have to be made up by purchases in the open market. In Ireland the KK club is an example of a successful marketing contract. This is a marketing contract for Aberdeen Angus beef cattle that supplies a niche market through Kepak a beef processing group. A mutually beneficial approach has been adapted in Ireland where suppliers work closely with farmers and develop long-term working relationships. This approach must be commended.

Marketing contracts are commonly used for crops around the world. Under a marketing contract, a price (or pricing mechanism) is established for a commodity before harvest or before the commodity is ready for sale. Most management decisions remain with the grower, who retains ownership of both production inputs and output until delivery.

With a marketing contract, the farmer assumes all risks of production but shares price risk with the contractor.

(b) Futures contracts

Futures contracts shift the risk from a party that desires less risk (the hedger) to one who is willing to accept risk in exchange for an expected profit (the speculator).

Generally, the effectiveness of hedging in reducing risk diminishes as yield variability increases and the relationship (correlation) between prices and yields becomes more negative. Farmers who hedge must place money on deposit that acts as margin against the position they are taking. Alternatively they can deal through a third-party that is prepared to place this money on deposit – for instance a co-operative. Hedging can reduce, but never completely eliminate, income risk.

(c) Future option contracts

Future option contracts give the holder the right, but not the obligation, to take a futures position at a specified price before a specified date. These financial instruments are derived from future contracts.

The value of an option reflects the expected return from exercising this right before it expires and disposing of the futures position obtained. Options are similar to insurance in that they provide protection against adverse price movements, while allowing the option holder to gain from favourable movements in the cash price. To gain this protection, a hedger in an options contract must pay a premium, as one would pay for insurance.

- 4) Risk: Financial liquidity
Response: Financial planning

Financial Liquidity is the farmer's ability to generate cash quickly and efficiently in order to meet short-term financial obligations. Strategies can include managing the pace of investments (which may involve postponing unnecessary purchases), selling assets (particularly assets that will not affect the revenue generating capacity of a farm), and holding liquid credit reserves (such as access to additional capital from lenders through an open line of credit). Furthermore off-farm employment may provide a stream of income to the farm that is more reliable and steady than returns from farming.

- 5) Risk: Drop in yields
Response: Insurance

In the US the risk associated with high yield variability and the resulting income variability are dealt with by programmes such as Federal crop insurance, as well as by diversification and other tools to help spread farm level risk. In a more volatile European Union agricultural commodity market there is a need for the EU and farming community to examine the Federal crop insurance scheme. Furthermore insurance products, used in conjunction with hedging, can protect one in the event of poor weather affecting the ability of a producer to deliver against the hedge.

Of course a cost will be incurred for this insurance and at times this cost will be uneconomic or the risk so small that it is not worth insuring against. However this is for each farm organisation or producer to decide upon. (This is dealt with in detail later in the study).

Other strategies employed to combat poor yields include cereal farmers planting short-season crop varieties. These mature earlier in the season and beat the threat of an early frost. The installation of supplemental irrigation in areas where rainfall is inadequate or unreliable is also practised.

6) Risk: Adverse interest rate fluctuations

Response: Fix rates, interest rate cap, interest rate collar, interest rate options

A business with borrowings is exposed to an interest rate cycle that is independent of the stage of development of the business. Thus if interest rates were to increase unexpectedly at a critical growth stage the entire business can be put at risk.

Fixing interest rates is an option open to individuals but at times this can be an expensive route. In 2003 for a €1 million loan the extra cash required to fix the interest rate for a five-year period was €26,000. This cost was linked to the long-term expectation that interest rates were going to increase over that period. Fixing rates is less expensive if the interest rate expectation is decreasing rates.

There are other options available for businesses to protect themselves without getting locked in to an expensive fixed rate. These include an interest rate cap, an interest rate collar, and an interest rate option.

(a) An interest rate cap

This is effectively an insurance policy taken out on a borrowing for a period ranging from two to seven years. The cost of the cap depends on the level at which one wants the interest rate capped, the amount of money which the cap protects, and the period over which the cap is in place. Naturally the lower the interest rate level of the required cap, the higher the amount involved, and the longer the period the cap will be in place, the more expensive the policy.

For example, a cap at 4 per cent is going to be much more expensive than a cap at 6 per cent, because the risk of the rate going above 6 per cent is much lower. If over the life of the agreed term rates go above the level of the interest rate cap the bank provides compensation. For example in 2003 a cap of 4.5 per cent for five years cost 1.36 per cent as a front-end premium on the borrowing. It is possible to negotiate spreading the payment of the premium over the five-year period. A cap of 6% over a seven-year period cost 1.02% (or around 0.15% per annum).

(b) An interest rate collar

An interest rate collar provides one with protection if interest rates exceed a pre-agreed level. The cost incurred for this policy is if interest rates fall below a particular level the policyholder pays the bank this difference. Thus there is an agreed range within which neither the bank nor the policyholder is affected. When rates go above the capped level, the bank pays the policyholder the difference. Where they fall below the agreed floor level, the policyholder pays the bank the amount by which they have gone below the floor.

The advantage of an interest rate collar is that it guarantees a band within which one's interest costs cannot fluctuate. Furthermore the cost for capping the interest rate can be offset by the premium received for providing the floor (or minimum guaranteed return) to your bank. Thus there is no upfront cash requirement and these policies are called zero premium collars.

For example in 2003 a five-year collar was available where a cap of 4.5 per cent was linked to a floor of 2.76 per cent. Thus if the three month Euribor rate went above 4.5 per cent at some stage over the following five years, the bank compensates the policyholder for the amount of the excess. If it falls below it the policyholder compensates the bank for the difference.

(c) An interest rate swap

An interest rate swap is an agreement between two parties to swap interest rate payment obligations (fixed for floating or floating for fixed) with one another on a notional sum over an agreed term in the future.

It is effectively an additional contract separate from the loan agreement; if one loan is repaid, the interest rate swap contract can be used to hedge the interest expense on a different loan.

Consider a loan of €1 million on which the agreed interest rate was three-month Euribor plus 0.75 per cent (thus a variable rate). If the borrower wished to reduce the uncertainty of future interest payment levels one could enter into an interest rate swap agreement.

Under this arrangement an agreement is made to swap loan terms with a counter party that has existing borrowings with the bank. The bank pays the policyholder whatever the three-month Euribor is on the above sum at agreed future dates. In return the policyholder pays the bank a fixed interest payment on the same date. Thus the Euribor cash inflow under the swap agreement will offset the Euribor cash outflow under your loan agreement. Your net cash outflow will be the fixed amount you pay the counter party under the swap agreement.

The advantage of interest rate swaps is they can be used to hedge different borrowings at different times and for different periods, or parts of borrowings for different times and different periods.

You might decide, for example, if you have €1 million of borrowings that you want to hedge the interest cost on half that amount, but are happy to leave the interest expense for the next 18 months unhedged. In those circumstances you would take out a forward interest rate swap on a sum of €0.5 million. The forward swap means that the start date of the contract does not commence for another 18 months and runs for three, four, or five years thereafter, depending on your requirements.

Another possibility is known as a 'swaption'. This is an option to enter into an agreement to fix your interest rate at some stage over the next two years at a pre-agreed rate for a pre-agreed period in the future. The 'swaption' is an option (but not an obligation) to enter into an interest rate swap at a future date.

By way of example an upfront option premium of 2.83 per cent was being charged in 2003 to enable a borrower to enter a swaption agreement at 3.5 per cent, fixed in a year's time for five years.

While this may look expensive, it reflects the fact that an individual has the benefit of low interest rates for the next year with the flexibility to fix at a pre-agreed rate for five years, in one year's time.

7) Risk: Adverse currency fluctuations

Response: Spot transactions, forward contracts, and currency options

The recent volatility between the euro and the dollar displays how volatile currencies can be and how they can have an influence on commodity markets. During just 4 months of last year's growing season, US Midwest corn prices fluctuated a minimum of \$130 dollars per acre. These price swings were greatly influenced by a US dollar that saw a 20% fluctuation in its buying power during the last 12 months and a Brazilian real, whose value changed as much as 65% in 2002.

In 1999 international dairy commodity prices dipped considerably in US dollar terms, due to the absence of import demand from Russia over the period. However processors in Eurozone countries were somewhat insulated from these declines, by the progressive depreciation of the Euro against the US dollar. The weak Euro helped maintain the value of third country exports in Euro terms. In the absence of these currency exchange rate movements, the decline in milk prices would have been larger in this period.

A factor that will make the risk of adverse currency fluctuations more prevalent going forward is the reduction in the use of export refunds. In the past adjustments in the value of export refunds could filter out some currency volatility. However as export refunds are reduced over time, the influence of currency volatility on commodity prices will increase.

For businesses wishing to protect themselves from adverse currency fluctuations the starting point is to establish the exchange rate required in order to achieve the desired profit margin on their product or service. Exporters should then build a hedging policy around this exchange rate. Typically an exporters policy will be to use spot transactions, forward contracts and currency options, or a mixture of each. Exporters can also place 'orders' with their banks to sell a pre-determined amount of currency if a desired exchange rate is available in the market.

The cost of currency hedging

Considerable debate has been seen in the recent past over whether it is good policy to hedge one's currency or not. Attention centred on the decision by the New Zealand co-operative Frontera to hedge their currency and the subsequent 'loss' that was incurred.

Suppose one hedges in the expectation that exchange rates will fluctuate and one is proved wrong: exchange rates are stable. Although a cost of hedging is incurred the product is priced correctly for the market, regardless of the exchange rate. Presume now one does not hedge. The currency depreciates and surprises the market. The proceeds in your home currency is less than expected for each unit sold yet raising the local currency price by even a little will make one uncompetitive. Business cannot afford to make this bet. The consequences of being wrong are too serious. Regardless of the exchange rates or the probabilities, maintaining a competitive local price is the single most important element to succeeding in the market.

The essence of risk management is the recognition of variation. Losses do not stem from average results but rather from deviations from the mean - the outliers of distributions. Focusing on the mean of an event or bell curve ignores the events in the tail that can put one out of business. Nobody expected the extent of the decline in the equity market from 2000 to 2003 – but it happened.

(a) Spot foreign exchange

Spot foreign exchange simply means dealing the currency at the time or near the time of sale of one's commodity. The supplier is then aware of the sale price he will achieve in the local currency. However little control is achieved as currency markets may already have moved to make the trade in question unprofitable.

(b) Forward foreign exchange

Forward foreign exchange contracts allow the fixing of rates for buying or selling foreign exchange on a certain date in the future. Time options allow for variable delivery dates and flexibility on early take-ups, rollovers and cancellations. Exchange of funds takes place only on the future date. These instruments allow a trader to lock in currency rates in advance and remove the risk of currency fluctuations from the equation in advance.

(c) Currency options

Gives the holder the right (but not the obligation) to buy or sell a fixed amount of currency at a given rate on or before a certain date. There are various options strategies available that can be designed to meet the requirements of the type of transaction in question.

Most commonly a combination of the above strategies is used to manage currency risk. Going forward agricultural commodity exporters will be forced to have a renewed focus on their currency management programme to control the level of risk incurred by their shareholders or co-op members.

- 8) Risk: Drop in revenue
Response: Revenue insurance

Revenue insurance pays indemnities to farmers based on revenue shortfalls instead of yield or price shortfalls. Group Risk Income Protection and Adjusted Gross Revenue policies are available to US producers. These programmes are subsidized and reinsured by USDA's Risk Management Agency. (These are dealt with later in the study).

3.0 The risk of short-term commodity price fluctuations

Price-level uncertainty over a given period is the consequence of imperfect information about future domestic and international supply and demand conditions. Agricultural commodity prices respond rapidly to actual and anticipated changes in supply and demand conditions. Potentially large swings in farm prices and incomes with little change in production levels have long been characteristics of the sector. For the unprotected, forced sales at low prices can result in significant losses and needs to be protected against.

Commodity futures markets offer protection to the commodity producer through offering an insurance mechanism against price fluctuations. In simple terms sale prices can be agreed in advance before the production decision is made. The existence of a futures market offers the producer a business-like attitude to production decisions and the capacity to plan confidently in the future. In some parts of the US, for instance, banks provide loans for beef fattening operations on the basis of the producer securing a beef futures contract. This contract guarantees a sale price for the animals at some point in the future.

Trading mechanisms that would provide the EU producer some measure of control over the price fluctuations in the commodity market would be of great benefit. Excessive price volatility can destabilize farm income, inhibit producers from making investments or using resources optimally, and eventually drive resources away from agriculture.

3.1 How do commodity futures work?

The main functions of the futures markets are price discovery and risk transfer. Trading in futures enables shifting risk from an individual that desires less risk to an individual who is willing to accept that risk in exchange for a possible profit. It is a zero sum game. The end result of each transaction is one market participant will profit and the other will lose, depending on which party has correctly forecasted events.

The advantage for the commodity producer lies in the fact they can position themselves within the market as hedgers rather than speculators and let a third party take the risk of short-term price fluctuations. A hedger can be a farmer, a trader or processor, who wants to 'lock in' a price for a commodity he is going to sell or buy on the spot market at a later stage.

Are futures markets a new concept?

Historians pinpoint the merchant trade fairs of Renaissance Europe during the 12th century as the start of modern futures trading. Dealers would meet with customers and sell goods that would be delivered when the next caravan rumbled through. A year round trading centre in England called the Royal Exchange of London was set up in 1570. Good-sized futures markets in Japanese 'rice tickets' traded from 1600 to 1910. US futures trading commenced in the middle of the nineteenth century with the introduction of 'time' and 'to arrive' contracts in corn. Chicago was the mother city of futures and is still its home. 1982 saw the introduction of options on commodity futures in the Chicago Board of Trade.

The US has the most developed and recognised futures market in the World. Commodity trading is dominated by the Chicago Board of Trade that was established by a group of traders in 1848. The US dollar is the prime dealing currency of commodity trading around the world. Cereal contracts are the most established type of futures contract and carry the highest volumes. Meat and livestock future contracts are relatively young and were introduced at the Chicago Mercantile Exchange in 1957. As of yet the European market has a relatively underdeveloped futures market as the Common Agricultural Policy supported prices in the past and thus negated the need for alternative price risk management tools.

Once a futures market is established a whole industry evolves around the existence of a futures market. Commodity brokers advise agricultural producers and commodity processors and deal on their behalf. Brokers provide broker reports forecasting trends in the commodity markets, facilitate deals to hedge commodity positions, etc. Traders or speculators make a living taking trading positions on the markets and provide liquidity by increasing the volumes of contracts traded on the markets. This assists the process of price discovery.

Clearing houses settle trades and providers of insurance policies depend on these markets to control the risk they are taking in the provision of policies. This industry makes money by charging commissions on each trade executed that can range from as little as \$40 a trade for a discount broker to a percentage of a trade for a full service brokerage account. Cost will increase with the size and type of service provided (advisory or execution).

How are futures contracts structured?

The basic role of the futures market is price discovery. The market determines, through the participation of all relevant market participants, the relevant price levels that can be achieved for different commodities at various points of time into the future. This process involves setting the price for a specified quality and quantity of a commodity to be delivered at a specified point in the future at an agreed location.

Delivery can be physical or cash. If delivery is physical the actual commodity can be delivered to honour the contract at the agreed location. This is outlined by the terms of the contract and will obviously vary depending on the commodity exchange in question. If cash settlement the market cash value of the commodity must be paid. Most commodity markets are cash settlement as the futures market is an economic tool to control risk rather than a method to buy commodities. Most future contracts are closed out (sold or bought back) before expiry as their function of controlling price risk has been achieved at this point.

The risk-reducing effectiveness of hedging increases as the correlation between the farm price and the futures price increases. In other words, the more closely the futures market price mirrors the farm price, the better it works for hedging risk. This is why it is so important an efficient futures market operates with a high degree of liquidity and many diverse market participants. In this way the price reflected on the futures market will reflect market reality thus providing an effective hedging mechanism.

Not all participants in the market need to use the futures market to take advantage of the price information it provides. When two parties come together, to make a deal on a load of cattle for instance, they do not have to take out a contract on the futures market. They can simply use it as a reference price and draw up a futures contract on the price information displayed on the futures market. Obviously this only occurs if mutual trust exists between both parties to fulfil the terms of the contract.

3.2 Types of forward pricing strategies

This section describes the various forward pricing strategies available to agricultural producers where efficient future markets are in operation. It is a summary of information acquired from the Chicago Board of Trade and various commodity-trading guides available around the world.

The aim for the hedger in the market is to lock-in the price of their commodity at some point in the future. The choice of strategy with which to do this will vary for each individual depending on a number of factors. These include the attitude to risk by the individual or business, the financial soundness of the business in question, the probability of production meeting expectations, etc.

3.2.1 The cash forward sale

A cash forward sale is a contract between a seller (e.g. a farmer) and a buyer (e.g. a grain processor) requiring the seller to deliver a specified quantity of a commodity to the buyer at some time in the future for a specified price. At times a pricing formula may be agreed in advance based on the quality of the product produced.

Most cereal growers in the US sell forward at a fixed or “flat” price based on an observed futures price quote. Some farmers use basis contracts that specify a “set” price difference relative to the futures price to be applied at delivery time. This basis can be at a premium to the futures price in areas of scarce supply or at a discount in areas of excess supply.

Some farmers use “hedge-to-arrive” contracts that fix the futures price component and leave the basis to be determined at delivery time. The rationale behind this is the basis discount will be less in excess supply areas (or the basis premium greater) if the market demand is strong at time of delivery. This allows the producer to establish price protection but participate in any price upside if supply is scarce.

Cash forward contracts eliminate both price-level and basis risk by locking in a local cash market price for the quantity under contract, but any production in excess of the hedged amount is still subject to routine market price risk.

Case Study

A corn producer in Ohio US plants 1000 acres of corn with an expected yield of 150 bushels per acre. At planting time, the projected harvest-time price is \$2.50 per bushel, the local cash price is \$2.38, and the basis is \$0.12 ($\$2.50 - \2.38). The producer feels there will be an excess supply of corn in the market this year and does not wish to take the risk of commodity prices weakening. A decision is made to forward contract the farm’s entire expected corn production of 150,000 bushels at a price of \$2.38 to realise an expected revenue of \$357,000. The consequences of this decision will result in the price of the commodity at the time of sale.

There are three possible scenarios described below.

Scenario A – The price is lower than expected

If the price at harvest-time is \$1.80, the operator still gets \$357,000 for the crop, \$87,000 above what he would have got in the cash market.

Scenario B – The price is higher than expected.

If the price at harvest-time is \$2.70 the operator again gets his expected \$357,000 for the crop. This is \$30,000 less than what would have been achieved in the cash market.

Scenario C – The harvest is different from expected

If the producer harvests only 85 bushels per acre there will be a shortfall of 65,000 bushels to deliver against the sold forward contracts. The net revenue under this scenario will be different than expected as the producer will have to buy back 65,000 bushels in the futures market and realise a cash loss or gain on his trade depending on the price action of the market in the intervening period. This outcome illustrates the income risk associated with yield risk when an operator forward sells 100 percent of the expected production at planting time. For this reason producers manage the process of forward selling during the growing season as information on likely crop size transpires.

3.2.2 A futures hedge

A futures hedge involves the sale of a futures contract as a temporary substitute for an intended sale on the cash market. In simple terms this means a producer is selling his product in advance. Later, at the time the actual commodity is sold the futures contract is bought back to eliminate the futures position. The hedger gets the expected price, as movements in cash and future prices during the period of the hedge tend largely to offset each other. The difference in the value of the contract from sale to buy-back may be a profit or loss depending on the price direction of the commodity during the life of the contract. This difference will negate any cash difference thus delivering on the original price expectation. The primary advantage of a futures hedge is the elimination of the price-level risk of an existing production situation by locking in a price for the commodity.

Hedging requires relatively little investment, as only a small portion of the futures contract's face value is required as a margin payment that guarantees delivery of the contract. However if the market starts to go against the position taken a hedger may be required to put up additional margin during the life of the hedge – known as a margin call. Adverse price movements on the short position taken can result in margin calls that may place a cash strain on individual farmers. This strain is temporary until the position is closed but in the event of a production shortfall can be a real loss. Thus for the hedger sufficient cash resources have to be available to deliver on any possible margin call. While this aspect of hedging may be a real disadvantage to the cash-strapped producer intermediaries like co-operatives or processors can play a role here. They can manage the short-term cash requirements and provide the farmer with the opportunity to forward sell.

Hedging provides flexibility as hedgers can build their position over time as market and production information becomes available. In reality producers will initially cover part of their expected harvest (say 50%) to protect themselves from unexpected volume shortfalls in production. Subsequently they can increase their price cover nearing harvest time.

A hedger can eliminate price risk by hedging but will still be exposed to basis risk. Basis risk is the uncertainty that exists of the price difference between the futures contract and the cash market. Basis difference can widen and if this happens the price guarantee can reduce by the extent of this widening. Basis risk is absent for hedgers who can make delivery against their futures contracts, but the cost of making delivery exceeds the loss on the basis in most cases. Also most futures markets now operate on cash delivery rather than physical delivery.

Hedging requires the establishment of an account with a commodities broker, placing orders with the broker, and being prepared to meet margin calls. Consequently, most farmers prefer to access futures markets indirectly by forward contracting with their local commodity buyer or trader like a livestock dealer or grain store. Thus it is these participants that will use the future markets to hedge their risk and manage their positions by delivering on margin calls, etc.

3.2.3 Options

(a) A Put Option

A put option is the right, but not the obligation, to sell a specified number of futures contracts at a designated price (called the strike price), at any time until expiration of the option. A call option is the opposite and gives one the right to buy a contract at a designated price.

Cash or futures contracts fix the future sale price of a commodity. This prevents the seller from gaining or losing from subsequent price movements. Options on the other hand lock-in a price but also allow participation in any subsequent upside. Options allow participants to hedge the downside but participate in any potential upside by having the choice rather than the obligation of exercising the option to sell or buy at a given price. If the price appreciates the producer will choose to exercise the option by buying a contract for a commodity on the exchange and subsequently selling it at a higher price thus realising a profit. If the cash price is lower than the strike price agreed to exercise the option then the holder will choose not to exercise the option as this action would result in the realisation of a loss.

As with a futures hedge, a put option hedge is subject to both production risk and basis risk, since ultimately, any futures position entered into upon the exercise of a put option will likely be liquidated and the grain sold into cash markets. But unlike a futures contract hedge, the premium is forfeited upon payment even if the put option is never exercised. If the cash price that can be acquired for a crop is much greater than the price that can be achieved by exercising the option then it will be left lapse.

(b) A Call Option

Another strategy is to use a call option. Purchasing a call option gives the producer the right to buy a given quantity of a commodity at a certain strike price at a point in the future. The producer can then sell his product into the market and by holding the call option participate in any upside in the market.

A farmer may be a buyer or seller at a set level or may want to purchase a call on the same day as they sell the physical (which results in a true hedge). The cost of the option will depend on the volatility in the market and how far into the future the exercise date is. In short the greater the level of volatility and the longer the life of the option - the greater the cost of the option.

Case Study: Use of a call option

An Irish cereal farmer harvested 9,000 tonne of wheat in 2002. He had not entered into a marketing contract and on harvest took the view that the market price of wheat was at a low and would improve over the following months. At the time the European Union allowed the importation of quantities of wheat from the Black Sea area thus depressing prices.

On discussion with a UK commodity broker and Nuffield Scholar, Robert Kerr, it was recommended the farmer consider the purchase of a call option. In this instance the cereal farmer did not go ahead with the trade but the following would have been the scenario and considerations involved if he had.

The farmer could have sold 5,000 tonne of wheat thus raising cash and saving on storage costs (and probably overdraft facilities). He could then have purchased a July '03 call option. A July '03 contract expires the second Thursday of June. If the contract is "in the money" on that date it will automatically be exercised and monies sent to the client. If it is "out of the money" on that date it just expires and the farmer is glad he sold his physical wheat, as the cash price will have fallen in the meantime. The farmer could also have purchased a May '03 or June '03 option depending on his view on the speed with which the price would recover.

The cost of the option on the 30th of October '02 for 5,000 tonne was euro 5.55 per tonne at the then exchange rate of 0.631 to sterling. Thus the cost of purchasing the call option for 5,000 ton was euro 27,750 including commission costs. The strike price is whatever the last trade is on the market – at £68.75 in this instance or at the above exchange rate euro 108.95.

So if the cereal farmer had gone ahead and purchased the call option the farmer would have achieved three things:

1. Put a minimum price on his physical wheat by selling the wheat and saved on overdraft charges.
2. Taken advantage of any up-side in the market price in the event the price of wheat increases past euro 114.45 (108.95 strike price plus 5.50 cost) over the following months.
3. Save on any storage cost that would have been incurred if the farmer had decided to store the wheat and wait for the market to improve.

For this exercise to be an effective hedge there must be a sound relationship between the local market price and the price action on the futures market. In other words the factors that affect commodity prices on the futures market must also affect commodity prices on the local market. If the price of wheat on the futures market goes up for instance and the price on the local market goes down, while the net result for the producer will be lucrative the exercise will not be an effective hedge.

3.2.4 What is the optimal amount of the crop to hedge?

The farmer who chooses to use futures to reduce price risk must take various considerations into account. Not only must a choice be made between the various types of contract (cash, futures or options), but also a decision must be made on the percentage of production to hedge. This will depend on the production risk that the producer faces as well as the basis risk.

Cash forward contracting alone eliminates basis risk. Basis risk generally is small relative to price level risk but can be significant especially in locations distant from the future markets delivery points. The production risk associated with a forward pricing contract depends on the variability of the yield on a farm. If the yield varies to a large degree from year to year then hedging may not be a very effective risk reducing strategy. This is due to the risk of not having sufficient crop to deliver on a forward contract and the subsequent possibility of losing on futures positions.

3.2.5 The dangers of forward selling

An example of the dangers of using forward selling without sufficient safeguards can be exhibited as far back as the 13th Century. Wide-scale commercial use of the futures market can be exhibited by the experience of the Cistercian Monks in Yorkshire in England at that time.

The Cistercian Monks were successful farmers in their own right in the 13th century with the distinct economic advantage of not having to pay for the labour supplied by their members! They were also not liable for rates and taxes. Monks at Rievaulx in Yorkshire owned 14,000 sheep at their peak. Future markets were used to lock-in prices in advance and boost their income to fuel growth. Eventually, however, their flock of sheep caught scabies and the monks found they had no wool to meet their contracts. Their downfall was the result of excessive sale of forward contracts and lack of cash reserves. In order to deliver on the contracts they had sold they were forced to buyback these contracts at the prevailing market price (which had shot up) but did not have the cash from the normal wool sale to raise the cash. This situation resulted in bankruptcy.

Many other examples are available that demonstrate the dangers of unprotected futures trading. However conservative strategies properly implemented add value over the longer term.

3.3 Future contracts for beef

The use of futures for European beef farmers is in general presently a foreign concept. A small percentage of beef producers use marketing or production contracts. Future contracts do not exist. The existence of a liquid EU beef contract with high quality specifications would offer an EU trading reference to participants in the beef industry. Efficient market systems could allow traceability while a joint EU effort at marketing this contract would result in a better result than individual countries competing with each other on a world scale.

The argument is often used that different types of breeds of animals taste differently on slaughter and thus using a contract to sell beef in general is not practical. However different breeds of animals are fattened side by side in feedlots across the US. A 100,000 feedlot near San Francisco contains a constant proportion of Holstein Friesians destined to supply a chain of restaurants in San Francisco. The Chicago Board of Trade contract futures were used to establish a sale price for these animals.

3.3.1 Case study – Gordon Hazard Westpoint Memphis USA

In the United States the use of futures in order to manage the price risk in beef is part of the business of beef fattening. Gordon Hazard is a veterinary surgeon, world war 2 veteran, and beef farmer in southern Tennessee. Gordon runs 1,800 beef cattle on as many acres in a temperate climate that allows cattle to be kept outside all year round with the aid of supplementary feeding. Gordon concentrates on rearing purchased bull calves to feeder cattle stage and sells to fattening lots (called feedlots in the US). The day Gordon buys his animal he can fix his sale price through the use of beef contracts.

How can a price be determined months in advance?

Beef contracts are traded in two forms on the Chicago Mercantile Exchange (CME) live cattle contracts and feeder contracts. These contracts and their relevant specifications can be viewed on the CME website at www.cme.com The first contract is for feeder cattle or cattle ready to go into fattening units, the second for fattened animals close to slaughter. The CME can be checked daily for the current price of these animals and also the futures prices that have been agreed into the future by buyers and sellers thus fulfilling the primary aim of a futures market price discovery. Large numbers of buyers and sellers result in large volumes of contracts that properly reflect the reality of the market price.

A feeder contract on the CME represents 22,727kg of 318kg to 385kg of feeder steers – perhaps 65 animals depending on their average weight. Eight different contract months are available to choose from depending on the expected month in which the beef animals will be ready for the feedlots or slaughter. As producers can discover what prices they will achieve in the months ahead they may adjust their production schedule to take advantage of better prices – a self-regulating market mechanism.

Does Gordon Hazard deal with the Chicago Mercantile Exchange?

Gordon himself does not deal on the Chicago Mercantile Exchange. However he uses the price on the CME feeder board as a reference price to draw up a futures contract with a buyer through a local broker. The agreed price is the price he will be paid for his reared beef animals on the specified date chosen at the agreed weight on delivery to the feedlot. Gordon buys his animals initially through his broker thus ensuring no animal will be refused due to breed or composition on delivery.

Once Gordon's cattle reach the weight specified on the contract within days of the agreed delivery time he will receive the price he expects. If however the cattle are too heavy or too light he will be penalised in accordance with the terms of the contract.

Sample contract

Suppose Gordon buys a load of feeder animals weighing 450 lbs costing 90 cents a pound thus a purchase price of \$405 each. The desired weight of the animals when ready for the feedlots is 775lbs. A contract will be agreed with a sale price depending on what is displayed on the feeder board futures on the relevant future month.

Suppose feeder cattle are quoted at a price of 75.99 cent per lb in the relevant month in which Gordon will have his animals ready for sale. Gordon has to allow for up to a 2% weight loss of the animals in transit (called shrinkage).

What are the disadvantages?

Hazard can 'lose' if he enters a futures contract that subsequently offers too low a selling price and in the months approaching delivery market demand strengthens. This will result in a lower price than what he could have achieved on the cash market. However the expected price is achieved and a minimum price is put on his profit level. Of course he can choose to abstain from the futures market in the short term if he thinks the market price will improve and lock-in a better price closer to the date of delivery. A lower than expected price will be achieved if his cattle are under or overweight at time of delivery.

3.3.2 Why do we not have a futures market in beef in the EU?

Future markets exist to manage price risk. The beef producer in the United States is exposed to supply and demand market fluctuations and needs some level of insurance against price fluctuations. The futures markets serve this function. Up to recently beef intervention served as a floor to EU beef prices but with the advent of decoupling beef futures will be needed in the EU market situation. In Amsterdam the Euronext market already provides a forum for the trading of a pork contract used by producers in the fashion described above to manage their price risk.

With the introduction of the Euro it is easy to compare the prices achieved for beef across Europe. The trading of a beef contract on a recognised exchange like the Euronext would offer a visible price reference to participants in the industry. The market for niche products and localised branding will always exist and should be encouraged. However for the commodity product free market conditions provide challenges and this risk needs to be managed. Initiatives like beef contracts can play this role in the future.

What would a beef contract look like?

One standard beef contract would form the basis for the market with different types of meat trading at a premium or discount to this contract. Producer distance from the market would be accounted for by basis difference. The specifications for the contract can be drawn from the US system. A bull beef contract and a steer beef contract would be suitable. The following are two contracts that were proposed to the Euronext in the course of this Nuffield study. In order to progress the development of such a contract demand from the industry was quoted as being necessary to progress development in this area.

Contract 1 - Feeder contract

This contract would be for the farmer that wishes to rear the animals to fattening stage for purchase by feedlots or for individuals willing to buy and finish the animal. A contract for 20,000 kilos of 360kg to 440kg bull beef. Quoted in cents per kilo with a minimum price fluctuation of 5 cents per kilo. Contract months Jan, Mar, Apr, May, Aug, Sep, Oct, Nov. Physical delivery or cash settlement. Expiry on the last trading Thursday of the contract month in question.

Contract 2 - Finish contract

A contract for 20,000 kilos of 280kg to 300kg of 50% R, 50% O grade dead weight. Quoted in cents per pound with a minimum price fluctuation of 5 cents per kilo. Contract months Feb, Apr, Jun, Aug, Oct, Dec. Physical settlement or cash settlement. Expiry date on the last trading day of the contract month in question. Individual animals of less than 280kg or more than 300kg discounted 10%. U grades attract a premium of 10% and R grades attract a premium of 5%. O grades a discount of 5% and P grades a discount of 10%.

Cash or Physical Delivery

(a) Cash settlement:

All contracts open at the termination of trading are cash settled against the EU average price for the seven days ending on the Thursday that trading terminates. To establish this average price the reporting system of prices achieved in the main market venues would be used. Again this would assist in price discovery.

In 1999, legislation was passed for mandatory reporting of prices paid by processors in the US. This legislation was designed to promote a "fair market price" by making public traded prices. Producers can then compare price differentials among processors.

(b) Physical settlement:

In the experience of the Sydney futures market it was found it was good practice to establish the contract as a physical delivery contract and progress to cash settlement as the liquidity of the contract increased. This was to ensure the price was relevant to the actual market price. Delivery venues would need to be listed around the EU with consideration taken to minimise the transportation distances. Plant Delivery can be any slaughter day of the contract month plus the first two business days of the next calendar month. In terms of the Feeder Contract delivery can be any market day of the contract month plus the first two business days of the next calendar month.

Other contract details:

Seller pays cost, yardage, commission, grading, feed, weighing, etc. Actual contract specifications have much more detail and include such things as trading and position limits, duties of buyers and sellers, grading procedures, specific terms and methods of delivery, trading hours, expiration dates, etc. A working body comprised of interested market parties and exchange representatives would clarify the finer details.

3.4 Volatility in EU commodity markets

For a need to exist for a futures market in Europe one must look at the price volatility of commodity prices and future trends within EU agriculture. Partial or full decoupling is upon EU producers. If decoupling occurs price protection will erode. Partial compensation will be available for a few years and world commodity supply and demand will have an increasingly direct role in what the producer is paid for the physical commodity in a given year. WTO negotiations will put further pressure on export refunds and protectionism. Future agricultural trends point to increased price volatility.

Volatility is a measure of price change regardless of direction. We are all familiar with the fluctuating prices that can be achieved for commodities at different points in time.

Early attempts at dealing with price volatility around the world include such mechanisms as buffer stocks, international commodity agreements, buffer funds, and most recently in the EU experience of government intervention in commodity markets. None of the above mentioned schemes have been a success on a general basis. Buffer funds have gone bankrupt, as in Australia. Buffer stocks have proven ineffective, as with the large accumulations under US and EU farm programmes in the late 1980s.

Futures markets exist to control an individual's risk to price volatility. Thus the greater the price volatility in a commodity the greater the need for a futures market in that commodity. If volatility is high, then traders will be attracted to trade the commodity as opportunities will be evident over time. Of course these opportunities will result in either gains or losses, depending on the skill and expertise (and luck) of the trader in question. This volatility is a necessity for a liquid futures market as traders seek to exploit movements in commodity prices. When a market is liquid a price can easily be determined for contracts of various sizes.

3.4.1 How can price volatility be measured?

The price volatility of a commodity can be measured by calculating the standard deviation of the price. The standard deviation is a measure of how widely prices are dispersed from the average price (the mean) over time. Getting the standard deviation of a commodity price allows one to ascertain the extent one would expect prices to fluctuate from its average in the future. Thus the level of price risk incurred can be established. If a commodity is highly volatile then prices have large fluctuations in short-periods of time.

Technically speaking, standard deviation provides a quantification of the variance of the price data, not its risk. However while it is mathematically possible to have a high standard deviation of returns while exhibiting no downside risk, in the real world, the larger the swings in the price of a commodity the more likely it is to dip into negative territory. Though standard deviation measures volatility on both the upside and the downside, it is a good proxy for measuring the price risk with any commodity.

An EU futures market will help to reduce the overall level of price volatility experienced by producers in a given year. Forward selling works as price fluctuations within a given year for commodities are smoothed out. A forward sale also serves the purpose of putting a minimum price on a commodity sale thus capping individual farmers risk exposure. An agricultural market where price protection will not be on offer in the future by market controlling mechanisms like the Common Agricultural Policy will need an alternative risk management tool. A futures market offers a self-regulating mechanism to provide producers with a required level of protection.

4.0 Crop Insurance

Crop insurance, when available, can be a valuable risk management tool. Crop insurance protects against falls in yields or revenues that may occur during a growing season. It also facilitates access to short term credit facilities as it provides some level of financial security for the lender. The existence of revenue insurance schemes has a clear appeal for many farmers. Farmers are ultimately interested in the revenue result of their efforts regardless of whether low revenue results from low yields or from low prices and these schemes guarantee specific revenue.

Agriculture is hugely dependent on climate as slight changes can cause large fluctuations in annual income depending on the severity of climatic conditions. Northern Europe is fortunate as climatic extremes are uncommon in comparison to other parts of the world. However we have all witnessed extremes in weather in recent times that seem to be on the increase with the advent of global warming. Recent research shows the incidence of extreme weather events is set to increase over time.

These climate changes may lead to a number of potentially serious consequences. For example, mid- and high-latitude regions, such as much of the United States, Europe, and Asia, could experience an increase in the incidence of heat waves, floods, and droughts as the global climate changes. The impact of such extreme events on agricultural production will be significant. In 2003 EU wheat production is down about 10% due to excessive temperatures while yields are down around 75% in the Ukraine. The need for more widespread insurance products will be necessary.

Crop insurance is not a new insurance activity. European private-insurance companies have offered policies for single-named risks (such as hail or fire) for more than 100 years. Today, the largest crop-insurance schemes provide multi-peril crop insurance (MPCI). However, because of systemic risks, MPCI insurance products typically have public support through premium subsidies, administrative cost reimbursement and/or state reinsurance. Most MPCI crop-insurance schemes enjoy public support of 50-70% of the annual premiums paid.

When other factors are held constant, the magnitude of a producer's natural hedge has important implications for the necessity for insurance. A weaker natural hedge (where low prices more often accompany low yields) implies that forward contracting, hedging in futures, or availing of insurance products is more effective in reducing income risk than when a strong natural hedge exists. The easing of importing regimes in the recent past has been demonstrated by the importing of cereals from the Black Sea area. Furthermore the trend towards lower trade barriers going forward would imply the natural hedge to be weak, thus the need for insurance products to be strong.

The ability of insurance companies to hedge their risk effectively in the above scenario hinges on an efficient futures market. Thus the development of the insurance market in the EU will occur only on the back of a developed futures markets.

4.1 How insurance policies work:

How are the insurance terms calculated?

The level of the premium is set based on expected yields. Expected yields are calculated on the basis of the average yield over the previous five to ten years. Prices, or formulas for establishing prices, of revenue coverage are determined when insurance guarantees are set at planting. These are based on the prices of future contracts quoted on the futures market with delivery dates near harvest time. This procedure keeps the value of insurance consistent with the expected value of the crop.

Protection is secured against a fall in the price during the crop-growing season and not against declines that occur between growing seasons or over several seasons. The expense of an insurance policy will depend on how volatile yields have been over the previous five to ten years.

How are insurance premium rates set and subsidies applied?

An insurance premium is the amount an individual or business pays for purchase of insurance.

Under most private insurance policies:

Total premiums = expected indemnities + administrative costs + profit margin

Premium rates are determined by:

- the type of crop, size of insured unit, and coverage level selected
- the farm's loss experience and yield history
- the country yield and its historical variability

For a given crop at a given price, the greater the yield variability the greater the premium.

Some operations may choose not to avail of crop insurance for a variety of reasons. Some are outlined below.

- 1) Depending on the financial soundness of an operation the potential magnitude of a crop loss relative to the equity base may be very small, so the incentive to buy insurance is low.
- 2) Management objectives such as profit maximization or enterprise growth may supersede risk management goals and diminish the demand for insurance.
- 3) Diversification strategies (like off-farm employment) may be more cost-effective than insurance under some circumstances.
- 4) Some farms may reduce yield risk simply by altering cultivation and crop management practices, at lower cost, than the producer-paid share of the premium on a crop insurance policy.

Types of insurance available

There are two main types of insurance around the world

1. Yield insurance protects against yield shortfalls that are due to drought, flooding, frost, plant disease, insect infestation and other natural hazards beyond a grower's control.
2. Revenue insurance adds a degree of price protection, covering drops in expected revenue, whether they are the result of yield or price declines.

Producers can typically make decisions on an annual basis whether to participate in crop insurance. Before planting a crop a producer selects one type of insurance and a coverage level. The coverage level is the proportion of expected yield or revenue that the producer will insure. Naturally the higher the coverage level the higher the cost to the producer.

Premiums are determined when a producer obtains crop insurance, but are usually paid at the end of the crop-growing season. In the event of a payout the cost can be subtracted from any indemnity payment the producer might receive. Premiums can increase or decrease from year to year depending on recent yield experience and expected prices.

4.2 The US experience

Since 1980 US government agencies have driven expansion of crop insurance. They have encouraged farmer participation through subsidised insurance premiums. From 1980 to 2001 coverage for crop insurance has gone from 26 million acres to 212 million acres. Premium value has amounted to a value of \$3 billion. This includes \$1.8 billion in premium subsidy from the US government.

The US government manages their involvement through the Federal Crop Insurance Corporation (FCIC) and its administrative agency, the Risk Management Agency (RMA). The Federal Crop Insurance Corporation shares the underwriting risk with the private sector by absorbing the losses of insurance programmes when indemnities exceed total premiums.

They also help to ensure that premiums are a close representation of long-run expected indemnities. They regulate and promote insurance programme coverage while setting standard terms for insurance contracts. Operating cost subsidies are provided to private insurance companies that deliver crop insurance policies to the end-user.

Insurance companies can develop new insurance products that once approved by FCIC can be subsidised. There are around 20 insurance companies that deliver crop insurance in the US. The four largest insure around two-thirds of the volume of the total premium collected. While these companies cover a large area of the US there are smaller insurance companies that cover smaller low-risk areas. Insurance agents sell and maintain these policies and compete for business. These agents can be independent or can sell policies for many companies. In the event of a claim a loss adjuster inspects the site and a compensation payment is made.

Insurance underwriting gains or losses arise depending on the total premium collected versus the claims paid out. In government supported policies the underwriting risk is shared by the private company and the Federal Crop Insurance Corporation through reinsurance funds. These share in the gains or losses depending on the level of risk undertaken by the insurance company. Insurance companies must annually submit plans of operation for approval by FCIC so that the risk the company is taking is controlled. Based on this plan of operation the company in question will retain premiums or pay premiums to FCIC.

The level of insurance available can extend from:

- the catastrophic (CAT) coverage level that is 50 percent of the expected yield, insured at 55 percent of the expected price
- to 85 percent of expected yield, insured at 100 percent of expected price, or 85 percent of expected revenue.

The list of crops for which insurance is available in the US has grown from about 50 in the early 1990s to more than 110 in 2001, including many fruits and vegetables, several types of fruit and nut trees, nursery stock, and rangeland. The RMA estimates crop insurance is available for crops representing more than 90 percent of the value of all crops grown in the United States (USDA, RMA, 2002).

The costs to the US government of crop insurance

As the size of the US crop insurance programme has grown, so too have government costs. Premium subsidies have increased, both as premium subsidy rates have increased and as acres insured and the amount of insurance coverage (liability) have increased. Administrative and operating subsidies paid to insurance companies that cover a portion of the costs of selling and servicing crop insurance policies reached about \$500 million in 1999. Premium subsidies, which were about 30 percent of total premium in the early 1980s, reached about 60 percent of total premium in 2001.

Underwriting gains to the private insurance companies have averaged about \$165 million per year from 1992-1999. However these figures can fluctuate wildly. Net underwriting gains in 1997 were \$354 million, while yield losses due to floods in 1993 were responsible for net underwriting losses of \$82 million. In 1998, net insurance payments (indemnities minus producer paid premiums) amounted to \$747 million in the US.

4.3 Insurance case study in the EU

Farmers are not the only ones with the potential to be affected by poor financial results due to bad weather. Outlined below is how a UK construction company took out a policy in 2001 to protect its' level of profit. This example was kindly provided by Robert McGlynn of Davy Stockbrokers. A group of farmers could negotiate a similar contract tailored to their needs from a weather derivatives desk in any major EU financial institution.

UK construction company

In 2001 a UK construction company won a large contract to build a motorway in southern England. As work was outdoors, weather was an issue. Excessive costs from excessive plant rental and wages could result in the construction company losing money on the contract. A level of insurance to protect against lower output than expected due to possible bad weather was essential.

The first step was to define what level of rainfall would result in the work being affected. From experience, the construction company knew if 10mm of rain fell in a 24hr period for three consecutive days all work would stop on the construction site. The next step was to determine the probability of such an event occurring. Data available from the nearest meteorological station was used to assess how often this event had occurred in the last 20 years. The probability of such an event happening in the future was calculated on this historical data.

The cost of a work stoppage on the construction site was estimated at £120k per day. If it rained for more than 3 days at 10mm's per day it would cost the construction company £120k per day. The next step was to find a financial institution willing to provide insurance during the term of the building project. The Weather Risk Management desk at Credit Lyonnais, a French investment bank, was willing to provide this protection.

The critical 'event' was 10mm's of rain per day for three days. The contract written specified if this event occurred more than 20 times then Credit Lyonnais would pay compensation for each subsequent event. The construction company paid an insurance premium for this protection.

What are the relevant parameters that need to be determined for farmers for a similar type insurance contract to be written?

- (a) The level of rainfall that will restrict growth needs to be determined. This will be in effect a range of rainfall where excessive rain will waterlog land and too little will stunt growth.
- (b) The statistical probability of this range of conditions occurring can be determined through examination of historical meteorological data in any given area.
- (c) The likely economic cost to the producer must then be determined and the level of protection decided.
- (d) Various weather derivative desks in financial institutions must be approached and requested to price such a policy.

4.4 Continued product development in insurance products

New insurance products continue to be developed.

In 1991, Canada launched the 'Net Income Stabilization Account' (NISA) programme to encourage farmers to save for difficult financial times. The farmer's contribution to the fund earns a 3-percent interest rate bonus and is supplemented by a matching government contribution. Government contributions and interest earnings are not taxed until withdrawal. Annual farm contributions are limited to 20 percent of the year's sales, and deposits eligible for government matching are limited to the smaller of \$7,500 or 3 percent of eligible farm sales (gross sales of most primary commodities minus purchases of those commodities, such as seed and feed). NISA has no time limit on deposits, but account balances may not exceed 1.5 times the farm's 5-year average sales. Withdrawals are only allowed when farm income falls below an established threshold.

A programme of tax-deferred savings accounts for farmers to help farm operators manage their year-to-year income variability has been discussed in the US. Tax-deferred savings accounts would build a cash reserve by depositing income into special accounts during years of high net farm income. Those funds would be released during years of abnormally low income. Income taxes on eligible contributions would be deferred until withdrawal. Sales that attract Capital Gains Tax could also be considered as a likely contributor source for this account. Withdrawals from these accounts would be at the farmer's discretion triggering taxation liabilities on withdrawal.

The costs associated with such a proposal are primarily a decrease in government revenue associated with tax deferral. The benefits are mainly farmers' increased financial stability and diminished need for government farm programme payments or emergency aid payouts. Taxpayers could benefit if farmers' additional financial diversification and liquidity reduces the need for continued income support programmes or ad hoc farm disaster relief.

Crop and revenue insurance are valuable tools for agricultural producers in controlling their production risk. Risk protection is greatest when crop insurance (yield risk protection) is combined with forward pricing or hedging (price risk protection). Both have a role to play in risk management for EU farmers in the future more volatile agricultural market and efforts should be made to progress thinking in the area. Revenue insurance programmes merit consideration to protect farmers' incomes in more volatile commodity markets. All of these risk management tools are outside the scope of the WTO Doha round of negotiations. Pressure should be exerted to ensure these risk management avenues are fully explored and financially assisted by the EU in light of declining price support mechanisms.

5.0 Conclusion

The Common Agricultural Policy has bred a level of complacency since its inception. It is sometimes felt a market that offers a decent price for a given commodity is deserved. However markets are vibrant. Tastes change, eating habits change and demand changes. European competitors must develop, grow and learn to compete. World transportation costs are decreasing from year to year and technologies in preserving food during transportation advance. Trade liberalisation pressures continue to increase. The result is a competitive agricultural market on a world scale.

This changing economic landscape poses threats but also offers opportunities. New and expanding markets are open to European produce as well as foreign produce. European producers may not be able to compete on the cost commodity level but are able to compete on the value-added level. A perfect example of this is the sale of top quality EU cheese and butter products in the US market.

Social agendas that encourage the vibrancy of rural economies are to be commended. However these should be differentiated from, and avoid interference in, the business of farming. When the social agenda is allowed to interfere with the business of farming an uncompetitive industry is created. A clear strategy going forward in agriculture will only be sustainable if the strategy is based on economic fundamentals. Otherwise the strategy will be continuously changed as economic pressures are exerted. Economic decisions that are made on the previous economic rationale will suddenly be made defunct.

Within this vibrant agricultural economic landscape there is a role for risk management instruments, available in the US and around the world, to be considered to help manage the risk of farming for the benefit of all participants.

6.0 Recommendations

1. The creation of a futures market in the EU that allows participants in the food industry to hedge their price and supply risk through the futures market. Established quality parameters will serve as market guidelines for producers as well as communicating the demand of consumers. The operation of this futures market at a European level will be required for it to achieve the necessary scale to operate efficiently. A working body comprised of producer and processor interests, EU policy makers and commodity market exchange representatives should be formed to progress this area.
2. The development and promotion of risk management strategies for agricultural producers is necessary. The formation of a task force between representatives of the insurance industry and agricultural producers, supported by EU involvement, is required to develop strategies to help farmers manage their risk in an EU agricultural environment increasingly open to world trade. The price protection policies of the past will gradually be unwound but that does not mean assistance cannot be provided in other ways to the farmer.
3. Entrepreneurship should be supported to a greater extent. Each agricultural producer who is running a farm business has the skills to run a business in a different economic sector. The same principles apply. It is quite possible that this new industry will be economically more rewarding than farming. Farm organisations and government agencies supporting agriculture need to widen their brief.
4. Consumers ultimately drive the food market. Producers will have to adapt to changing tastes and market demands. In time markets will be driven by future contracts created to serve many specialist markets. In an Irish context the signs are already there with forward contracts for under 12 month beef, grain fed beef, grain fed lamb, off-season lamb, light pigs, organic produce, etc. These future contracts would best operate on a recognised exchange with established quality parameters and clearly defined rules for the benefit of all participants.

7.0 CONTACTS

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'The Traders' CBOT

Some terms explained

Basis

A term used to describe the variation between the spot price of a deliverable commodity and the relative price of the futures contract for the same actual that has the shortest duration until maturity.

(As there are gaps between spot and relative price until expiry of the nearest contract, the basis is not necessarily accurate. In addition to the deviations created because of the time gap between expiry of the futures contract and the spot commodity, product quality, location of delivery, and the actuals may also vary).

Basis uncertainty

Uncertainty about the difference between a commodity's local cash price and its nearest futures contract price—derives from uncertainty about future commodity movements and hauling costs.

Cash settlement

A term referring to the method used in settling certain future and option contracts whereby, upon expiry or exercise, the seller of the financial instrument transfers the associated cash position rather than delivering the actual.

(For sellers not wishing to take actual possession of the underlying cash commodity, cash settlement is a more convenient method of transacting futures and options contracts. For example, the purchaser of a cotton future that is cash settled, rather than taking ownership of physical bundles of cotton, will be required to pay the difference between the spot price of cotton and the futures price).

