



# **The Beef Farmer, Processor Relationship; What Needs to Change?**

A report for



**NUFFIELD IRELAND**

**Farming Scholarships**

By Aidan Gleeson

2015 Nuffield Scholar

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## Executive Summary

My name is Aidan Gleeson and I am a beef farmer living on the Limerick - Cork border in the south of Ireland. During my involvement in Macra na Feirme (the Irish young farmers' organisation) and more recently as County Limerick Chairman of IFA (Irish Farmers Association), I have seen frustrations building up between farmers and meat processors. I chose my topic "*the beef farmer, processor relationship, what needs to change?*" in an effort to address the adversarial positions that exist in the industry.

My hypothesis is that if common ground is found that all the stakeholders in the industry will benefit. This report is targeted at all the stakeholders in industry especially those in positions of leadership.

Farmers are seeking balance to be restored to the industry and should be rewarded for the key role they play. To achieve this, transparency in terms of the marketplace is vital. Beef processors strive to be as efficient as possible while maximising the return from the market place. They require the cooperation of producers to consistently supply suitable sustainable produce to meet the demands of a premium marketplace price. In an environment where a significant proportion of producers are operating at or below the cost of production, the challenge for the industry is how to improve this situation. To meet the challenges that threaten the future viability of the Irish Beef Industry. We must address certain objectives.

### Objectives.

1. Fostering Better relationships between all stakeholders in the industry.
2. Encourage innovation and adapt to changing conditions.
3. Provide leadership to encourage this innovation

## 1. Fostering Better Relationships between Stakeholders in the Industry

### Key Findings

To improve relationships between Irish beef industry stakeholders a memorandum of understanding (MOU) and an industry wide strategic plan must be implemented. Farmers will respond positively, if they are rewarded for their efforts and are part of the decision making process. Each of the partners in the industry must have access to all the information needed to make informed economic decisions.

### Recommendations

- Establish a body to address points of difference e.g. share of the final price, target specifications, returns on sustainability measures.
- Improve relationships between stakeholders by having independent adjudication of disputes.

## 2. Innovation and Adapting to Changing Conditions

### Key Findings

The world market is growing and consumers are demanding an ever higher standard of beef production. To ensure that Ireland can maintain its prominent position in the global beef market, we must ensure that animals meet market conditions and return maximum profitability by measuring the relevant parameters as in the Dairy and intensive agricultural sectors. Delivering on the consumer demand for an environmentally sustainable product is also vital.

### Recommendations

- Incentivise farmers, by demonstrating the real economic benefits to farmers' profitability through delivering a sustainably produced product under the Origin Green label.



- Incentivise the measurement of Key Performance Indicators (KPIs)
- Bord Bia to be vocally supported by a cohort of progressive beef farmers. Publicise the positive story of Irish beef farms by utilising the farmers themselves as ambassadors through farm tours for international customers and journalists.

### **3. Providing Leadership for Change in the Industry.**

#### **Key Findings**

In this industry, considering the economics, hard decisions need to be made by all stakeholders in terms of viability. However, considering the significant contribution that the beef industry makes to Irish society, it is important to foster political support to ensure viability for as many farmers as possible. The importance of fully functioning farmer representation cannot be overestimated in this regard. The global industry will not wait for slow adopters and leadership is required to enact the necessary change. The leadership roles in the industry need to be defined across all stakeholders.

#### **Recommendations**

- Government to explore the Australian Beef Industry Structure Act as a model for Ireland. Failing this, the IFA should lobby for the introduction of legislation which allows for a more streamlined structure for the Irish Beef Industry.
- Bord Bia to develop a pilot scheme where both farmers and processors have an input into all the links in the chain of supply.
- Teagasc and early adopters to encourage other farmers to improve production efficiency methods through example of best practice.
- Beef farmers to further engage with farmers' lobbies, discussion groups, advisory bodies and the media.

In conclusion the Irish beef industry finds itself fighting the prisoners' dilemma. This is where, when two parties to an enterprise (in this case beef farmers and beef processors) cooperate, the result is favourable to both but where both parties defect then neither gains. Ultimately both are better off by working together for the optimum result.

Amending the structure of the current Irish beef forum (roundtable) with each party signing up to a Memorandum of Understanding (MOU) would improve relationships between the parties by setting out a template of how stake holders can work together.

This would also foster innovation and adaption to change. All parties would feed into a meat industry strategic plan, with all parties privy to the same information on prices from farm to fork, thereby building trust and cooperation.



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## Foreword

I was brought up on a small farm in County Limerick. I was always interested in the farming industry, and had many role models among my neighbours and relations, who I looked up to and who inspired me to pursue a career in agriculture.

I have been involved in my community all my life, with the young farmer organisation Macra na Feirme for many years, and for the last 11 years as a county Officer and current County Limerick Chairman of IFA (Irish Farmers Association). In this role I found myself dealing with farmers frustrated in their dealings with Meat Processors. This came to a head in autumn 2014 when farmers protested outside meat plants across the country. I found that the issues concerning farmers on this protest were largely unchanged from a previous beef protest in January 2000; no progress had been made in moving the agenda forward in the intervening 14 years.

I chose my topic “the Beef Farmer, Processor relationship, what needs to change?” in an effort to address the adversarial positions held in the industry which if left unchallenged are destined to fester, with all parties continuing to grumble ineffectually about the situation with periodic outbreaks of hostility and no resolution of the issues.

The starting point of this report was to address decision making in a leadership role and how to provide leadership in the beef industry. In an environment where a significant proportion of producers are operating at or below the cost of production, the challenge for farmer leaders is how to deal with this situation.

My report will benefit farmers, the beef processors and all of the stake holders involved, by moving the conversation forward and addressing the causes for the lack of cooperation in the industry.

My hypothesis being that if common ground could be found, that all the stakeholders in the industry would benefit from the improved cooperation that would result from better working relationships.

During the two years of my scholarship studies I have travelled to France, Australia, Singapore, Hong Kong, China, the Philippines, Canada, the United States, the United Kingdom and Brussels.

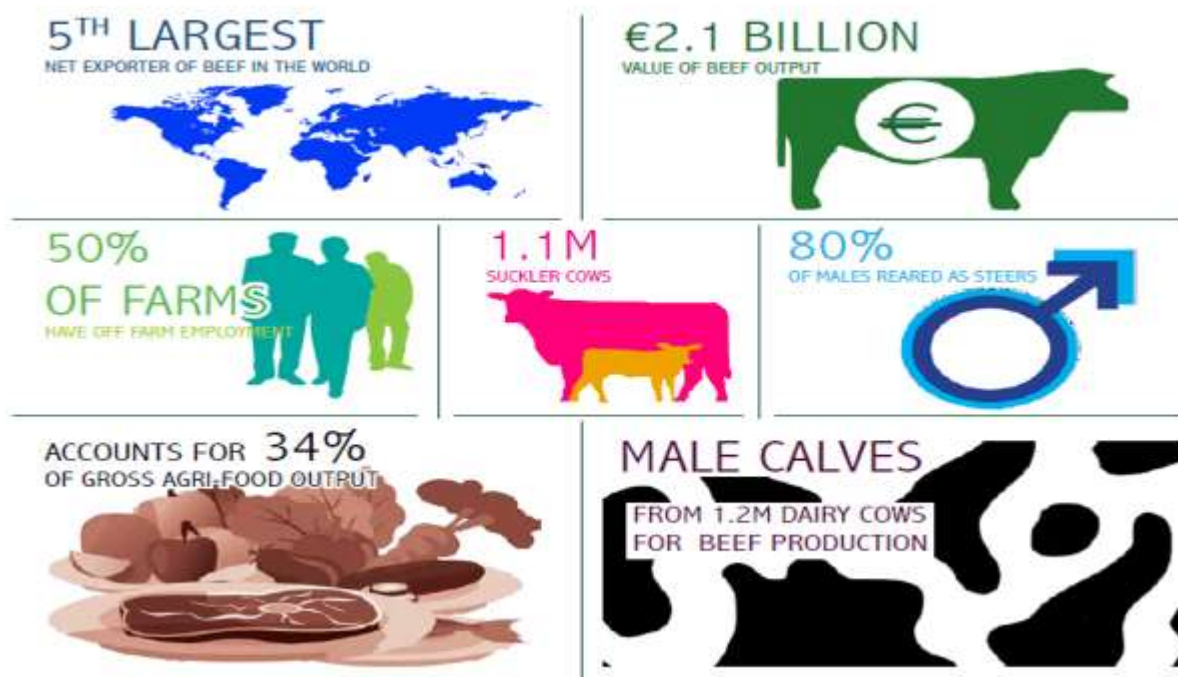
Also during this time, as a member of IFA’s national council, I was involved in the efforts to deal with the fallout from the controversy around remuneration, funding and corporate governance in the largest farm organisation in the country.

The whole Nuffield experience has been very rewarding for me. I made many contacts around the world, meeting like-minded people and broadening my experience and my expectations. It has inspired me to continue the experience into the future, by continuing to travel, to maintain and to make new contacts and to contribute to a community that has become much larger for me in the last two years.

I would like to thank all the Nuffield sponsors for making this experience possible for me.

## Introduction

The Irish beef industry is the 5<sup>th</sup> largest exporter of beef in the world, producing 2bn euros worth of beef annually. This accounts for 34% of national agri-food output. It is a vital contributor to the Irish economy.



(Bord Bia, Irish Food Board, 2015)

This report examines the relationship between all stakeholders in the beef industry and how improved relations will benefit all participants

The key objectives are to:

1. Foster better relationships between stakeholders in the industry.
2. Encourage innovation and adaptations to changing conditions in the marketplace.
3. Provide the leadership and environment to encourage this change.

## Fostering Better Relationships between Stakeholders in the Industry

Farmers are seeking balance to be restored to the industry, to be fairly rewarded for the key role they play and for transparency to be returned to the marketplace; in order to ensure they are getting their fair share of the market price.

Beef processors are striving to be as efficient as possible and maximise their return from the marketplace. They require the co-operation of producers to consistently supply suitable, sustainable produce to meet the demand of a premium marketplace.

The energy being expended by both parties in disagreements over fairness in the industry could be directed towards co-operation in addressing the challenges facing the industry.

In order for each participant to have confidence in the system legislation must be introduced streamlining the structure of the industry, allowing for each participant to have defined roles and an input into a strategic industry



plan. This allows each participant to contribute positively in the knowledge that all others are fulfilling their commitment to the effort.

## **Innovation and Adaptations to the Changing Conditions**

Promoting the advantages of an Irish beef production model, and establishing Ireland as a leader in low carbon, high quality beef production, are the challenges facing the industry (p.3, Dept. of Agriculture, 2009).

The growing demand for an increasingly more environmentally friendly, beef product can only be supplied by an efficient and highly sustainable industry. The long term sustainability of the producers and processors is a vital component of this. Producers must be encouraged to continue to improve their standards and if they find that they are being monetarily rewarded for these efforts they will respond positively.

Farmers will respond to this demand if they are rewarded for their effort and they are part of the decisions that need to be made. Processors will benefit from the consistent, dependable, supply that results from greater farmer buy in. The consumers will benefit from access to high quality beef, and the economy and the wider community will benefit from the stimulus to the local economies.

Bord Bia, the Irish food board, is working to promote all aspects of the Irish food industry. The beef producers need to get behind these efforts. They must open up their farms to allow access to international customers and journalists. By showing the true story of Irish production the image of Irish beef will be improved. Also the slower adopters of improvements will see the benefits and be encourage to improve.

## **Providing Leadership in the Industry**

In order for a better working relationship to be developed each stakeholder must be aware to the role they can play in that partnership. Each partner must know their role if they are to fulfil their part in advancing the industry.

There must be a way for this partnership to be defined and a mechanism devised for its development, to allow the appropriate markets to be targeted and to maximise the returns for all the partners.

We must ensure that each link in the chain knows the role that must play and that a structure is put in place to allow each partner to contribute to the future direction of the industry.

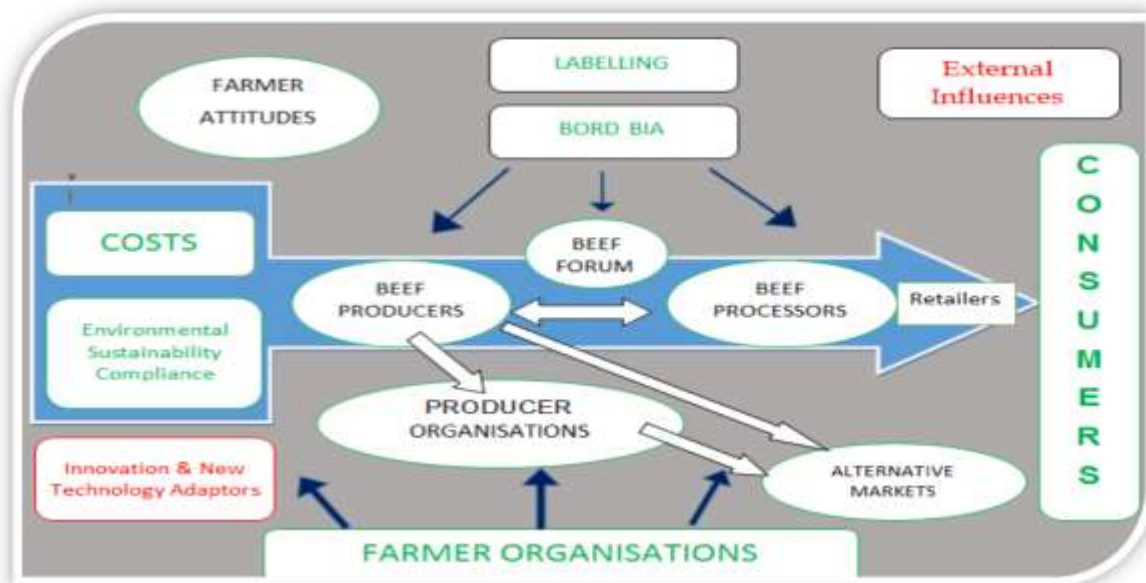
The farmers and processors must look beyond the traditional roles they have taken. Instead they must work together. If they can cooperate to identify, develop and supply a new market opportunity, where both have an input to all parts of the process, then this model can be replicated again and again. Each will have full knowledge of the requirements of, and returns from, the market and so will have no reason to mistrust the process.





## Chapter 1 - Fostering Better Relationships between Stakeholders.

### IRISH BEEF INDUSTRY STRUCTURE



(Diagram, author's own)

Currently, as can be seen from the above diagram, the relationships between the different stakeholders in the Irish Industry are complicated and conflicting. The different layers of organisation lead to a system that is difficult to manage. This is acknowledged by the Department of Agriculture, Forestry and the Marines, in its paper on the Meat Sector, 2009. This paper states that 'clearer communication channels are necessary along the entire chain to improve vertical integration and underpinning marketing efforts.' The players have vital roles to play but the lack of transparency and strategic organisation means that the level of confidence in the process is low.

### The Australian Meat Industry Structure Act 1997

Australia is one of the world's most efficient producers of cattle and was the world's largest exporter of beef in the year 2015/2016, with the total value of the Australian Beef Industry \$17.8bn in that year, (ABARES Agricultural commodities June 2016).

200,000 people are employed in the red meat industry including on farm production, processing and retail, (MISP 2015).

Australia produces 2.34 million tonnes of beef and veal per annum, with a value of \$14.3 billion, (ABARES Agricultural commodities June 2016).

The Australian industry exports 74% of total beef production with a value of \$8.5billion. Australia's live cattle exports had a value of 1.5 billion in 2015/2016, (ABS, 2016).

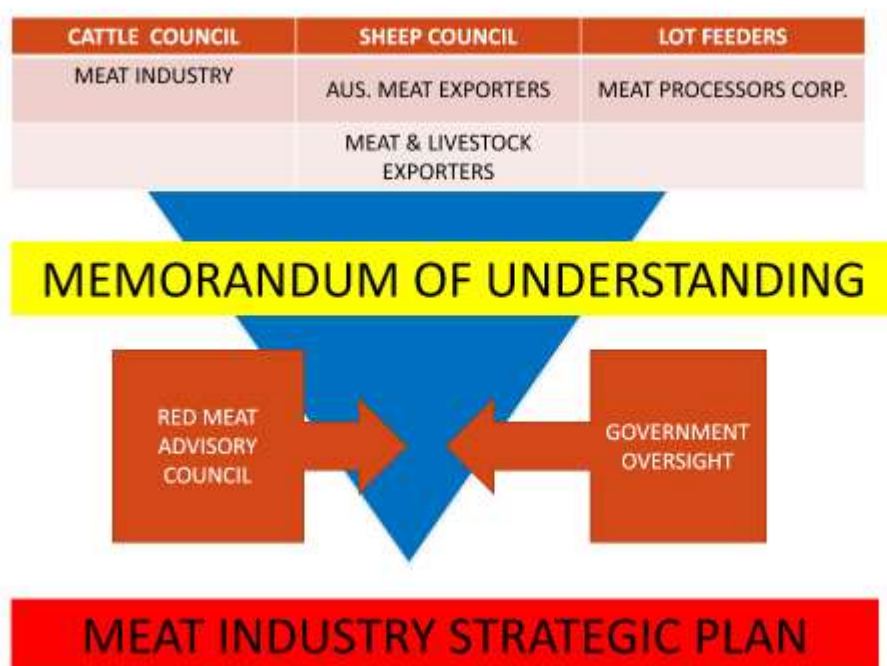
Their industry is underpinned by a Memorandum of Understanding signed up to by all the stake holders in the industry, including, the Australian Dept. of Agriculture, the Cattle Council, the Sheep Meat Council, the Lot Feeders, the Meat Industry Council, Meat and Livestock Australia, the Australian Meat Processors Corp., and the Australian Livestock Exporters. This MOU sets out the industry partnership between the signatories and



incorporates definitions of agreed roles and responsibilities for funding planning and funding service arrangements.

It also feeds in to a MEAT INDUSTRY STRATEGIC PLAN. This is a good example of how all the participants are contributing to the shaping of the industry. This is a model that the Irish industry can learn from. The current Beef Forum may in time evolve in to a mechanism resembling this, if the correct legislation is put in place. As previously discussed the Producer Organisations require some benchmarking mechanism and some form of oversight body. This Australian model provides a valuable example of how to achieve this.

The Australian Meat Industry Structure Act 1997 sets forth a model for co-operation between all stakeholders in the beef industry in partnership with, and supported by, the government. The aspiration is that all partners benefit from working to a defined goal.



(Diagram, Author's own)

The above diagram outlines the simplicity of the Australian solution. All stakeholders have signed up to a memorandum of understanding which outlines definitions of agreed roles and responsibilities and details funding, planning and service delivery arrangements. The MOU feeds into a **Meat Industry Strategic Plan** which gives each participant an overview and opportunity to influence the direction of the plan.

The Advisory Council is made up of one representative from each of the member bodies. It provides leadership on cross-sectorial issues and consults with the minister of Agriculture on agreed whole of industry issues. The government has observer status in the person of the minister of agriculture and oversees management of funding, including co-funding from government.

A lot of work would have to be done in the Irish scenario, to approach this level of co-operation, but there could be a pilot initiative established to develop a niche market from the ground up. If all the participants could identify this new market and an end user, willing to give a guaranteed price over a period of time in return for a guaranteed supply of verifiable standard. Producers and processors could co-operate in the production and marketing of this product and the distribution of the returns from this effort. If this was successful, it could be



used as the foundation of a new way forward in the Irish Beef Industry. This new way of working together would serve to demonstrate the workability of such a model.

### Farmers' Perspective

Angus Woods, National Livestock Chairman of the Irish Farmers Association, has said that,

*“We are an island of 5 million people with the ability to feed 55 million people... Beef farmers are the cornerstone of the industry and it needs to deliver for us and not just the processors.”*

Woods puts his faith in producer organisations, funded under the Rural Development Programme to restore balance to the industry and provide a margin for primary producers.

John Bambrick, County Kilkenny, a beef finisher stated that:

*“Farmers need to stand back and look at how they deal with the factories. There has to be some forward planning, as in the dairy and pig meat industries.”*

*“If everyone is in a Producer Group this will negate the advantage and will drive down the base price. As each group garners a top up on this lower Base price, the result is that the farmer ends up merely getting what he would have gotten in the old system. There must be measures put in place to ensure that this will not happen, we must have transparency in the Market Price.”*

### Beef Processor Perspective

The Department of Agriculture, Food and the Marine has approved for export thirtyone Meat processing plants. These 31 plants account for 94% of all cattle slaughtered in the Irish state, with an average of 52,000 cattle throughput per plant. (P. 12, Dept. Of Agriculture, 2009)

The largest processor is ABP which has 6 plants accounting for 21% of the national kill (348,000 cattle). Next is Dawn Meats which has 4 plants and accounts for 18% (298,000 cattle). Kepak has also 4 plants which account for 14% of the kill (232,000 cattle). Liffey Meats has three plants accounting for 8% of the national kill (13,000 cattle). Slaney Meats is the biggest of the single plant firms accounting for 5.3% of the kill (88,000 cattle), (PMCA report, 2016).

Colm Dore, ABP states that:

*“All the people involved in the industry care passionately about it. We need to rise above our differences and focus on our common goals.”*

*“It is the role of the Processors to be efficient from the first step to the last step. It is not a high margin business and we need to maximise the red meat yield of the animal, you need to pick your market and get your product right”*

Dore feels that it is important to get recognition for your product on a point of difference in the market, not necessarily price. In this regard Mr Dore feels that *“Bord Bia is doing a good job in promoting our product and farmers are seeing the benefits.”* Mr Dore also spoke about ABP's work on sustainability, their zero waste to landfill, recycling of water for washing and their wetland improvement work. All this has no direct impact on the price of their product but it is expected by their customers and helps in identifying their produce as a premium product.



### Competition in the Industry.

A report from PMCA Economic Consultants, published on Wednesday 31<sup>st</sup> of August 2016, and commissioned by IFA, deals with the competition impact of the proposed acquisition of the Allen Family shares in Slaney meats. This submission to the Director General for Competition regarding a proposed transaction in the meat processing sector, deals with many issues surrounding the relationship between farmers and processors. In its findings PMCA states that *“the overall conclusion of this report is that the relevant market that would be affected by the proposed transaction is characterised by weak competition currently or pre-transaction.”*

Furthermore, *“it is immediately apparent that the proposed transaction would give rise to competition effects in beef processing in the state”*. They also conclude that *“it is apparent that the proposed JV (joint venture) is a complex one necessitating careful examination by DG Competition and possibly involving the Irish Competition and consumer protection commission.”*

PMCA are recommending that DG Competition study the report and further examine the issue and come to its own conclusions and decisions.

Once we have a decision from DG Competition and possibly Ireland’s Competition and Consumer Protection Commission then we can deal with those decisions. This is a positive move as instead of both farmers and processors stubbornly digging in their heels and maintaining their positions, an independent party has been asked to adjudicate on the issue and once this happens progress can be made.

### International Perception

There has been a long standing poor public perception of the Meat industry (p. 141, Verbeke,1999) as any number of experts, commentators and enthusiastic onlookers are ready to talk about the high carbon footprint print and poor animal welfare image that it has. This may not be accurate but it is an issue that must be addressed by the industry.

A UN report published in May 2016 entitled FOOD SYSTEMS AND NATURAL RESOURCES appears to recommend that we “tax meat until it is too expensive to eat.” This report from the United Nations International Research Panel, recommends that meat should be taxed at the wholesale level to raise the price and deter consumption. This it claims will save the environment and prevent global warming. Lead author of the report, Professor Marten Hager of Utrecht University, says that “the harmful effects on the environment and on health need to be priced into food products.”

This goes a step further than fat taxes and sugar taxes to a food tax, which will not only be bad for food producers but will mean that low income consumers will suffer as a variety of food will be made only available to the affluent.

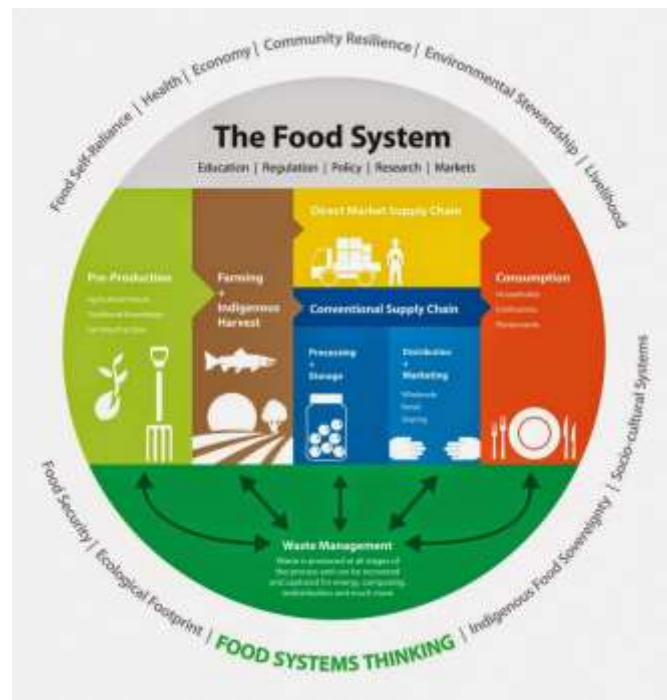
The livestock sector must meet the challenge of promoting the advantages that our grass based beef production has over other production methods, and that it can fit into the resource smart food systems which the UN report is promoting.

*“The sustainable and efficient management of natural resources is now imperative for the achievement of all 17 of the United Nations sustainable development goals” “restoring and maintaining the health of the natural resource Base is not only needed to adequately feed current and projected populations but to provide a better quality of life in the years to come”. “the food sector is globally the dominant user of a number of natural resources such as Land, Biodiversity, Fresh water and Nutrients, while food production is a major driver of bio diversity loss, soil degradation, water depletion and greenhouse gas emissions”. The people who manage*



*our food systems are the largest group of natural resource managers in the world and could become critical agents of change in the transformation of current consumption and production systems.”*

(UN Report, Food Systems and Natural Resources, 2016)



(Johnstone, P., 2014)

The challenge for producers and processors is to show the benefits of beef in the food chain, demonstrate a new, more efficient approach to livestock production and become global leaders in low carbon beef production. (Global Research Alliance, 2015)

To address this challenge, the farmers, processors and Bord Bia (the Irish Food Board) must use their combined strength to promote a truly environmentally sustainable model of Irish beef. This shows that it is possible to give consumers a choice of food without compromising the consumers' commitment to resource smart lifestyles.

### Bord Bia & Origin Green

Bord Bia is the Irish State Agency dedicated to promoting the quality and sustainability of Irish food and agriculture. It acts as a link between Irish producers and their customers worldwide. The Bord Bia Quality Assurance Scheme provides assurance to both consumers and trade buyers about the standards under which Irish food products have been produced ([bordbia.ie](http://bordbia.ie)).

Under this initiative farmers are audited against a range of standard including; animal health, welfare and traceability, water and feed, pasture management, environmental management and farm safety. In addition, some of the requirements for processors include product identification and traceability, inspection and testing, hygiene and good manufacturing practice.

### Origin Green

Origin Green is a programme operated by Bord Bia. The Origin Green promise is that it is the only sustainable programme in the world that operates on a national scale, uniting the Irish government, food producers and the



private sector. Its aim is to reduce environmental impact, serve local communities more effectively and protect the natural resources of Ireland.

These initiatives deliver real benefits to the primary producer, however they need to be supported by farmers. The more positive and motivated the individuals and groups of farmers that get behind the scheme the better. By hosting international buyers and journalists on their farms, the real environmentally sustainable and carbon friendly image of Irish beef is advanced.

This will push the whole industry in a premium direction. This will also encourage more and more farmers to come on board with the initiative and adopting the cost saving and performance benefits. This in turn will allow Bord Bia to prioritise more of the accounts and customers, who will return a premium to the farmers.

Quality assured food that is produced and processed in the Republic of Ireland, will have this Origin-Green quality label.





## Chapter 2 - Encouraging Innovation and Adapting to Changing Conditions

### Sustainability

Jim Woulfe, C.E.O. of Dairygold (a farmer owned Co-operative in Co Cork) said that:

*“In 1950, the world’s population was three billion. By 2050, that figure will have increased to nine billion and they will all have to be fed. This population is becoming increasingly more urban and disposable incomes of a large proportion of them, is increasing. They are also developing an appetite for dairy and meat products.”*

Ireland is ideally situated to cater for this marketplace with a high quality product, a low carbon footprint and a green food image.

Professor Alan Renwick of UCD said that the Irish Beef and sheep industry by 2020 will have increased by 234 million euros, increasing processing output by 400 million euros and providing for an extra 1200 processing jobs. In the overall economy this will be directly responsible for 1.5 billion increased output and up to 10000 extra jobs. The challenge at farm level, is to ensure that the farmer benefits from this growth and is not just working harder for tighter margins.

Farmers are operating with reference to higher environmental standards, higher food safety standards and a higher expectation of living standards for farm families. In other words, increased farm output must be achieved sustainably.

There are three components of sustainability (p 21, Marta-Costa, 2012)

- **Environmental Sustainability.**

The environment must be better off from advances in farming practices.

- **Social Sustainability**

Society and the economy must be better off from due to the efforts of the Farmer.

- **Economic Sustainability**

The Farmer must be better off after expanding his production.

The government Food Wise 2025, targets a 70% increase in food exports over the next 10 years, and states that the achievement of these targets will contribute to the European objectives for smart, sustainable and inclusive growth.

According to the 2015 Nielson global corporate sustainability report, 66% of global consumers say they are willing to pay more for sustainable brands. Brands that demonstrate environmental sustainability, that market their sustainability efforts and have a discerning sustainability strategy have been shown to outperform those brands that do not have the above.

The farming community have always been willing to respond to what is asked of them. They are ready to take on the new challenge of a growing world population and a demand for its product. However, farmers must not be left behind by this development.



All stakeholders must work together to ensure the long term viability of high quality, low carbon and environmentally friendly beef production and to redress the perception of agriculture, especially the image of meat production as a high impact sector.

The Global Sustainable Agriculture Initiative states its objective of *'ensuring the efficient production of safe, high quality beef in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities.'* (G.S.A.I. 2013)

## Innovation in Practise

There are many examples of co-operation in the agriculture industry, which can be learned from and applied to the Irish situation.

### International Rice Research Institute, THE PHILIPPINES

This body has undertaken enormous work over the years, to improve the knowledge, capacity, resources and technology available to the subsistence rice farmers of South East Asia. Since they were set up in the 1960s, there has been no instance of famine in the region. Their work has allowed farmers to develop, increase production and improve their lives.

They are now distributing their information on production to their farmers through websites and mobile technology.

Their mission statement is to *'ensure global rice supply, reduce poverty and hunger, improve health of rice farmers and consumers and ensure environmental sustainability.'*

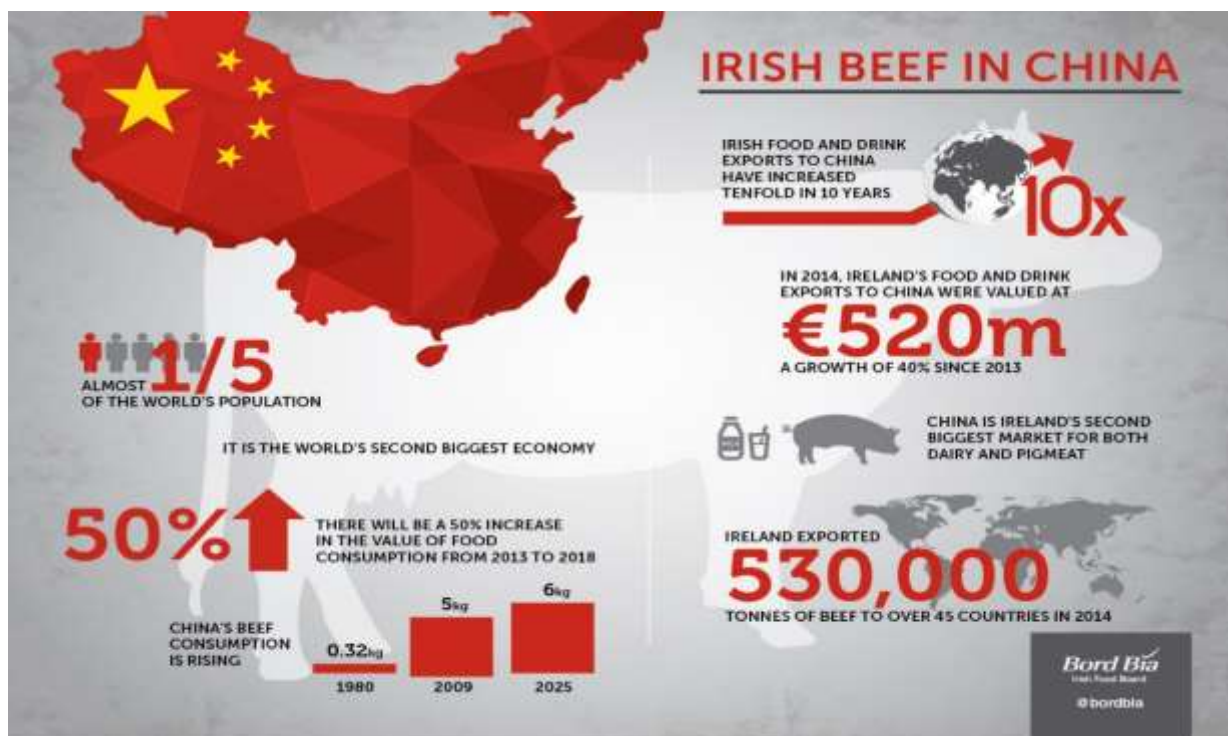
This is an example of an organisation that see the benefits of working with others, to improve an industry for the benefit of all stakeholders. Similarly, the Irish Beef industry must deliver benefits to its primary producers, processors and customers while also delivering real benefits to the environment.

### China

The population of China is due to reach 1.5 billion by the year 2030. It is the world's second largest economy, with 7% growth in GDP for 2015. It is the world's largest food importer, and domestic consumption is a major driver of growth.

Changing tastes are driving a demand for high protein products. This appetite demands better quality food with a higher nutritional value. In tandem with this, is a requirement for sustainably produced product.





(Shelf Life, 2015)

One of China's biggest challenges is the sheer scale of the country. Most of the population are city dwellers and there is a very poor image of farmers and rural dwellers in general. China is a society of opposites; from the Miao people of the Guizhou province farming rice in one or two Mu of terraced hillside, to the large agricultural companies growing maize on 10,000Ha. of fertile steppe in the Harbin region, in the north-east of the country.

The Miao people, when visited, were struggling with the repercussions of flash flooding a few days before, which had inundated the riverside paddy fields and washed out a good proportion of their already scant crop. On the other hand, the Harbin grain company have lucrative government contracts to store 1,000,000 tonnes of feed.

Agents of Official Chinese Governmental administration promote the aim of stimulating the indigenous farming economy, offering large grants to convert to profitable crops, such as kiwi fruit. The difficulty for the smaller subsistence farmers is access to capital and the fact that they cannot afford to go without their rice crop; two thirds of which go directly to feeding their families.

The government is also anxious to improve the image of farming and address the issue of consumer confidence, in the safety of home produced product. They're ramping up environmental standards and focusing on water quality, by trying to tackle farm pollution and the over-use and incorrect use of fertiliser and pesticides.

This is having the result that many farmers, including many larger producers, are considering the organic option, as an easy way of complying with the regulations and following the money that is being offered for conversion to organics.

Of course the lack of enforcement, of already existing regulations, will do little to inspire the confidence of consumers in the produce of these new converts and how this will help the cause of further self-sufficiency and the feeding of 1.5 billion people by 2030, is difficult to comprehend.



On the positive side, there is a huge appetite for imported food of all descriptions. According to Paul Niven of Fonterra, Beijing, the difficulty facing Chinese produced product and Chinese producers, is the lack of confidence in locally produced food.

There is a cohort of affluent consumers who have plenty of disposable income. They are ready to embrace the western lifestyle and are seeking access to high quality and safe food. However, the level of assurance required is not supplied by Chinese Agriculture.

In contrast to the Chinese situation, Ireland has a small population and has to look to foreign markets for its beef. There are high production and environmental standards. Rural dwellers can aspire to a good standard of living and Government policy is to support the family farming model.

This means that there are opportunities for Irish Beef on the international market and the positive consumer perception of Irish beef can be capitalised upon.

One notable exception to the lack of production standards in China is Grand Farms in Harbin. This is a large scale livestock producer and meat processor. They have modern meat processing and cold chain facilities and they are actively investing in improvements to their plants. They are getting a premium price on the home market for their value added prepared food products.

This shows that consumers will respond to a higher quality product and those that are willing to invest in improvements, will benefit from that consumer confidence.

The Irish Agriculture industry cannot become complacent about its production methods, It must strive for continual improvement so that it can maintain its reputation for quality food and use this advantage to lead the world in sustainable food production.

### Dairy Farming Initiative, CHINA

DFI is a collaborative effort between several multinational companies and third level institutions who have established a model of three different sized dairy farms on one site in the Harbin district of China.

Its aim is to use the most modern of farming technology to train the local workforce in up-to-date methods. The thinking is that the graduates from this initiative will go on to be leaders in the modernisation of the local dairy industry.

These graduates will be the future leaders in China's dairy industry and it is good to see that there is a willingness to invest in the future. However, the Irish industry cannot rest on its laurels in the belief that they are the best performers as others will improve in large increments as they have plenty of room for improvement and Ireland's increments for improvements are by nature smaller and smaller.

### Canadian Beef Industry

Canada produces 1.2 million tonnes of beef annually. In 2015 they exported \$2.2 billion (322,343 tonnes) of beef, representing 36% of domestic production. Canada ships to 58 countries but is reliant on the US for 71% of all meat exports. The industry contributes \$33 billion to the national economy and their beef sector generates 228,881 jobs. (cattle.ca, 2016)



### Bustard Ranch, Alberta, CANADA

This is a large beef spread in the mountains. Their challenge is the short season of 90-100 days of summer grazing. They are operating a rotational grazing system and while we would not recognise the grassland management system as similar to Irish conditions, they are making it work for them.

It was encouraging to hear them speak about their community involvement and the willingness of local people to get involved in conservation work along the river catchment, on a voluntary basis.

Even though the Bustards are a family operation with plenty of challenges, they recognise the importance of their role within the larger community. Their work with local volunteers raises the awareness of their neighbours of the reality of agriculture and how it serves a vital role in the conservation of the environment for the benefit of everyone.

### Irrigation, Calgary, CANADA

In Calgary water conservation is not a priority with the Saint Mary's irrigation district, their water policy is a use it or lose it model. Every farmer who has a water allocation is encouraged to use his full allocation.

There is no effort to encourage conservation and no real method to assess actual water usage. The belief is that if you are willing to pay for the energy to pump the water, then that is your own business. You would have to wonder how long such a policy can continue before water shortage forces a change.

This is an example of short-sightedness in the industry. There are plenty of dry land farmers in the area that could make good use of the water that would be spared by conservation efforts. This would boost the output of the district significantly but while the establishment protects the existing water rights holders, this will not happen.

They fail to recognise that the real competitors are not their neighbours but producers from around the world in a global marketplace.

### Sunterra Group, Calgary, CANADA

This group was set up by a family of brothers who were frustrated with their interaction with the meat processors that they had experience of. They went on to develop a business producing livestock, processing them in their own facilities and exporting internationally to places such as Japan. They have recently set up a group of stores to sell high quality food in affluent areas in Calgary.

This is a very integrated business taking the animals from the beginning to the end and extracting the maximum value from their product. Of course the scale required is considerable but it is an interesting example of a different solution to a perceived problem. They could simply have continued to complain about their lot but they decided to take action and reaped the rewards

Just down the road Calgary farmers' market is a co-operative set up some years ago by a handful of producers, with five thousand dollars each. They have more modest ambitions but they are making the most of their proximity to a lucrative consumer base and a reputation for selling a high quality, extensive range of local food. Both these enterprises have seen the benefit of cutting out the middle man and selling their high quality product directly to the end consumer.



### Western Feedlots, Alberta, CANADA

This group is one of the most respected feedlot companies in Canada. They have invested heavily over the years in technology and software development designed to streamline their business and increase efficiency, each animal arriving in to the system is analysed and imputed into the system to ensure that they are grouped in lots that will finish at a similar spec, and each group gets the optimum conditions and feeding regime to ensure that they return the maximum profit and to the market requirements.

Dave Plett the manager of this operation believes in the use of 'Knowledge and Education to bring value back in to the economy'. He believes in measuring everything that is under his control, right down to 'individual animal management'. Having its origins as a collaborative initiative between the local ranchers the onus is on giving ownership back to the community.

This was an example of an operation that was doing everything possible to get the optimum performance from their animals and their people. Unfortunately, their shareholders have made the decision after 58 years in the industry to wind down their cattle ownership and cattle feeding operations by early 2017.

They have cited the poor political and economic environment and the high risks low rewards in the industry which have contributed to their decision to shutter their operations.

This example illustrates that producers will not continue to produce in the face of poor returns. If conditions are not favourable they will begin to exit the industry, starting with the most efficient.

In order to ensure the long-term viability of the beef industry a way must be found to ensure a better return to the primary producers.

### United States

The United States is the largest producer of beef in the world, producing primarily grain fed beef from feedlots for domestic and export use. Nevertheless, the United States is a net importer, purchasing in lower value cuts destined for processing.

The retail value of beef in the United States was \$105 billion (24.8 million tonnes) in 2015, (USDA 2016).

### The Brochi Family, Burbank, Washington State, United States

The Brochi family produce seven million boxes of apples a year and set up in 1969, with the aim of using an apple orchard, to help needy kids. They have a mainly Latino work force. The men work in the fields and women in the packing house. The company provides day-care, schools, housing for eight hundred people, a gym, and a church, career advice and training are provided.

They believe in producing the best product possible and farming is seen as something to be proud of and an honourable profession. The Brochi Farm is an example of a business that values their employees and benefits greatly from the loyalty and dedication of those employees.

This shows an example of an operation that is motivated by something other than profit, but by investing in the future of their people they get optimum results, which in turn allows them to expand what they can do for their community.



### Washington D.C., United States

Michael Scuse, the under-secretary for agriculture explored such topics as free trade agreements and equivalence of standards. He described these as artificial barriers to access to the European market. He did not consider that the U.S. might change their production methods to accommodate E.U. standards. He relied instead on breaking down the resistance of the E.U. to their product.

David Solomonson from U.S. Farm Bureau covered such ground as tax issues, availability of labour and country of origin labelling. His most remarkable quote was *“Beef is a fairly generic product. Consumers are not worried about where it comes from.”*

This is in stark contrast to the Chinese example, where their consumer is very aware of the origin of their foods. This comes from the fact that the American industry is a very protected market and that the prevailing taste of their consumer is for a ground beef product. Also their consumer has been accustomed over time to accept hormone treatment and GM products.

Some observers may take the view that the higher standards in the European market put the European farmers at a disadvantage, but in reality this is a benefit as it allows those who have the ability to produce the highest quality to differentiate their product and target the premium markets.

### National Farmers Union, Stonleigh, UNITED KINGDOM

The British farmers are struggling with a lot of the same issues as the Irish producers, except that 85% of British production goes to the local market place, while the majority of Irish beef goes to external markets. They are struggling with how to even-out supply across the year and the uneven implementation of specifications by processors.

There are also a sizeable number of British producers exploring alternative marketing strategies, such as Simon Cutter of Model Farm Shop in Hereford, selling organic meat directly to the public. In addition, Hearts Barn in Gloucester run a cookery school, showing the public how to use their food products in a new way and thus creating a tailor made customer base.

Tom Dracup of the National Farmers Union in the UK, expressed an interest in the Irish use of Producer organisations to address the evening out of beef supply and also in developing a closer relationship between Ireland and the UK to develop new markets and a common marketing strategy for “our very similar product”, but in order to make this attractive to the British producer it would have to have a high market return.

### Brexit

The prospect of the UK leaving the European Union has major implications for the Irish beef industry and Irish agriculture as a whole. It will put obstacles between Ireland and its biggest trading partner.

The aim of Irish policy makers must be to achieve a free trade agreement between Ireland and the UK. This must be achieved in the face of some European interests who are reluctant to give the British a “*soft exit*” (Coffinier, 2016)

For the Irish beef industry, it is important that its product, Irish beef remains attractive to the British customer who may in the future have a greater choice between cheaper product sourced from South America, Australia or elsewhere, but which may not have the traceability and production standards demanded of European Producers.



In order to be successful in this market, Irish beef must not attempt to compete on price alone, but must differentiate itself as a high quality, environmentally sustainable and local product. The Irish producers must appeal to the British Consumers comfort with the Irish beef brand as a premium product and do everything possible to enhance this image (Matthews, 2015)





## Chapter 3 - Providing Leadership to Encourage Innovation

Cooperation between producers and processors in the Irish Beef Industry is vital to meet the challenges of the changing market. Irish producers need to get a premium for their superior production methods, and farmers need to see a tangible return from all the regulation and cost of compliance, in order to maintain their confidence in the process.

The farmers need that incentive and must reap the benefits in order to encourage them continue to produce at the same level and to continue to improve their production methods to meet the changing market.

### Political Will

Simon Coveney, former Minister for Agriculture stated in an interview with the author on the 14th of July 2015 that “sustainability and resilience is the important thing in the Industry, our grass based system is very resilient but farm profitability is key”.

“Farmers cannot be allowed to merely produce more for less ... Agriculture is deep rooted in the political arena in Ireland and with the globalisation of food, where America is protecting its farmers through the farm bill, Europe will have to do the same. Farmers cannot be the ones left behind”.

Michael Creed, the current Minister for Agriculture, puts his faith in a renewed Market Strategy, the Beef Forum and Producer Groups to deliver for Beef Farmers.

Minister Creed spoke about “*emerging markets for Irish Beef such as the United States who require meat for grinding and South East Asia*”

He said that “*there will be no Beef Industry without Beef Farmers, and there must be a fairer return to Beef Farmers, we need to work together on strategic issues to take advantage of the opportunities out there.*” He further spoke of “*The amount we have done on reducing inputs and costs, and we cannot ask the Agriculture sector to go beyond the point that would affect production. We have the most carbon efficient Producers on the Planet and the fifth most efficient in the EU on Carbon.*” *We must embrace the environmental agenda with confidence and together we can meet the challenge.*”

### The Importance of Fully Functioning Farmer Representation

European farmer organisations have a militant reputation. Media reports of clashes with riot police can grab short-term attention, but they do not deliver results in the form of higher prices for farmers.

The Irish farmer organisations have protested, participating in the Brussels farmer protests, in September, 2015. However, their more important function is to represent the views of their members in direct talks with government, processors and on bodies such as the beef forum. From a government and processor point of view, it is better to have unified representative bodies to deal with rather than many smaller groups, all looking for different results.

This is why the controversy that engulfed the Irish Farmers Association from November 2015 to April 2016 and the re-organisation that continues at present has been an important issue. It is essential that the correct steps are taken to fully restore confidence of producers in their representative bodies. One of the issues that was discussed in detail, during the IFA election (spring, 2016) and the candidates’ interaction with members, was the European Involvement Fund (voluntary membership levy).



The portion which is collected from beef producers through the beef processors is seen by some as compromising stance of the farmer organisations, as this important source of income passes through the hands of the processors.

The farmer organisations argue that there is no compromise involved and the collection of levies through cattle sales is the most efficient and painless method of collection.

There are a number of alternatives for levy collection; one of which includes a levy on cattle tags. However, this would result in the uneven collection of levies, the major burden of levies being paid by cattle breeders and dairy farmers.

Another option would be an increase in organisation membership fees. This would be highly unpopular and self-defeating as the reduction of membership numbers would negate the increased fee.

The collection of a levy directly from producers would be cumbersome and expensive and difficult to implement, but it has the advantage of being very transparent.

This is an issue that the farmer organisations must decide on, and find a solution that is acceptable to their members.

Strong, well-funded farmer organisations are important, as are profitable and sustainable processor groups, to provide balance for the future of the industry.

Angus Woods, IFA's Livestock Chairman. When asked about the issue of Beef Levy Collection said that *"the real issue is the response of the industry to IFA's examination of the lack of competition in the industry and our submission to the European Competition Authority. The value and service that Farmers derive out of their membership is enormous for a levy of .15% on their produce"*

On the proposal of Producer Organisations Mr Woods stated that *"very few producers are expressing an interest in Producer Organisations, and why are they being restricted to representing a maximum of 15% of Producers when there is no limit to the other side of the equation ... also a situation may occur when members of Producer Organisations may well be on a lower base price than producers not signed up to one of these groups."*

### Prisoners' Dilemma

As can be seen from the prisoners' dilemma example, as explained by Dr. Hanna of RIT (see appendix 1), where two parties to an enterprise so-operate, the result is favourable to both. When both parties defect; then neither gains from the effort. So even though each participant may feel that they can outsmart the other, both would be better off to work together for the optimal results from their mutual efforts.

|              | B cooperates         | B defects            |
|--------------|----------------------|----------------------|
| A cooperates | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |





A defects

|          |          |
|----------|----------|
| A gets 5 | A gets 1 |
| B gets 0 | B gets 1 |

*‘That is, the Nash equilibrium prediction in this case is that both A and B will choose to defect, and will earn only 1 each. This is a prisoner’s dilemma outcome because both would be better off if they chose to cooperate.’*  
(Dr. Hanna, RIT, 2016)



## Conclusions and Recommendations

### Fostering Better Relationships between Stakeholders in the Irish Beef Industry

| Issue            | To improve relationships between Irish beef industry stakeholders   |
|------------------|---|
| Research Lessons | <ul style="list-style-type: none"><li>• Implement an industry wide Strategic Plan and MOU</li><li>• Equip producers to be more efficient and sustainable to improve their long term viability</li><li>• Vital to feedback economic parameters to farmers</li></ul>  |
| Conclusions      | <ul style="list-style-type: none"><li>• Farmers will respond positively, if they are rewarded for their efforts and are part of the decisions that are made.</li><li>• Progress can be made once a body has been established to address points of difference e.g. share of the final price, target specifications, returns on sustainability measures</li><li>• Improve stakeholders' relationships by having independent adjudication of disputes.</li></ul> |
| Recommendations  | <ul style="list-style-type: none"><li>• Implement a Memorandum of Understanding:<br/>Defines agreed roles and responsibilities for funding, planning and service agreements.</li><li>• Each stakeholder has a part in the formation of this planned so understands the end goals.</li><li>• Introduce legislation giving more powers to the Beef Forum, with the Minister for Agriculture adjudicating.</li></ul>   |

### Innovation and Adaptation to Changing Conditions

| Issue            | More meat needed but consumers demanding a ever higher standard of beef product  |
|------------------|--|
| Research Lessons | <ul style="list-style-type: none"><li>• Optimum conditions to ensure animals meet market conditions and return maximum profitability</li><li>• Measure your parameters</li><li>• Importance of meeting the Green Agenda in modern agriculture</li></ul>  |
| Conclusions      | <ul style="list-style-type: none"><li>• Stakeholders to be financially rewarded, information provided so farmers are part of the decision making process.</li><li>• promote the uptake of better farming practise and continuous improvement, producing a better product to match market demands.</li><li>• Promote the green image and differentiate it from other less environmentally friendly producers.</li></ul> |
| Recommendations  | <ul style="list-style-type: none"><li>• Incentivise farmers by demonstrating the real benefits to market return from a sustainably produced product.</li><li>• Bord Bia to be vocally supported by a cohort of progressive beef farmers.</li><li>• Publicise the positive story of Irish beef farms, using the farmers themselves as ambassadors.</li></ul>  |



## Providing Leadership in the Beef Industry

| Issue                   | Too much time and energy expended on futile arguments by all industry partners   |
|-------------------------|--|
| <b>Research Lessons</b> | <ul style="list-style-type: none"><li>• Hard decisions need to be made by all stakeholders - no one owed a living</li><li>• Government will provide leadership in the absence of the industry taking control</li><li>• Foster political support</li><li>• The Importance of fully functioning farmer representation cannot be underestimated.</li></ul>  |
| <b>Conclusions</b>      | <ul style="list-style-type: none"><li>• Define the leadership roles in the Industry (Farm Bodies, Processors, Research, Advisory, Marketing, Consumers, Government)</li><li>• Ireland to use natural advantages to differentiate the product and lead the industry</li><li>• The Global Industry will not wait for slow adaptors – leadership required to enact change</li></ul>                                       |
| <b>Recommendations</b>  | <ul style="list-style-type: none"><li>• Government to explore the Australian Beef Industry structure Act as a model for Ireland.</li><li>• Failing this, IFA to lobby for the introduction of legislation which allows for a more streamlined structure for the Irish Beef Industry.</li><li>• Bord Bia to develop a pilot scheme where both partners have an input to all the links in the chain of supply.</li></ul> |

### 1. Foster better relationships between all stakeholders in the industry.

Progress can be made, in improving relations between all stakeholders, once an independent body has been established to address points of difference between participants. An example of this is the disagreement between ABP and the Irish Farmers' Association regarding ABP's proposed joint venture with Slaney Meats. IFA's submission to the Director General for Competition will be adjudicated upon. Each side can make its case and once a decision has been made, both must accept the result and move on.

### 2. Encouraging innovation and adapting to changing conditions.

The industry is better positioned now than a number of years ago, when agriculture was seen as a twilight industry and the idea of a post agricultural society was being promoted. We're now in a new global food environment where consumers and policy makers are becoming more aware of the origins of their food. They are making decisions that are based on more than cost. This more sophisticated consumer is looking for an environmentally friendly, sustainable and high quality alternative. Older farming generations abandoned outdated methods and embraced new technologies and likewise, the Beef Industry must adapt and encourage a new approach to the marketplace. (p. 145, Linton, 2013)



The Irish Beef Model is way ahead of other parts of the world in its environmental impact and quality methods of production, but there must be a continual drive for improvements in the sector. The best way to ensure to bring more and more farmers on board with this drive is to ensure that they are financially rewarded and feel that they are part of the process rather than being driven in a direction that they do not see the benefit of.

### **3. Providing Leadership to Encourage Innovation**

The old adversarial relationship between beef farmers and processors will not serve for the future. A new co-operative attitude must be developed within the industry.

Beef processors need a dependable supply of consistent type animals to meet their market commitments. Farmers need an incentive to produce at this level and continue to improve their production methods to meet the changing markets. This can only be achieved by farmers and processors working together to maximise the value of the product, to increase their return from the market and target the highest paying consumer market, using our environmental sustainability and green image to promote the best beef on the market. The political will exists to move the Beef Industry forward.

The Australian Model, as outlined in the Australian Meat Industry Structure Act, 1997, addresses the above three objectives. It fosters better relationships between stakeholders by defining a way for all participants to have an equal say in the future direction of the industry. It encourages innovation giving each participant an overview of the entire model and industry plan, so that each knows the role they must play and the benefits that they will derive. Lastly, it provides the leadership required to encourage innovation and development to the future.

It is important to note that rather than dismantling the current structure, it simply re-organises the existing structures into a more streamlined model. It is something that can be trialled on a pilot basis, so that its suitability to the Irish situation can be established.

In order to foster better relationships within the beef industry, a common goal must be agreed upon by all the stakeholders, so that they can work towards that goal together. In order to combat the poor international perception of the meat industry, farmers and processors must show that they are leaders in low carbon, high environmental standards and excellent welfare standards.

Encouraging innovation by equipping farmers to be more efficient and more sustainable will improve their long-term viability. Farmers will respond to this if they find that they are rewarded for their efforts and are part of the decision making process. Processors will benefit from a better more consistent product. Consumers will benefit from access to higher quality beef product. Also the wider community will benefit from stimulus to the economy.

To provide leadership for change in the Irish beef industry the relationship between farmers and processors must be clearly defined, each must know what their role is and how they can fulfil their part in advancing the industry. There must be a way for this partnership to be defined and a mechanism devised for this partnership development.



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## Appendix 1: Prisoners' Dilemma (Source Dr. Bridget Hanna, RIT, 2016)

The example below is one where (using the concept of a Nash equilibrium) we would predict that both parties will “defect” (not cooperate). That is, the example is one that we think would be applicable to what we see in the beef processing market.

The set-up of the situation is that we have two parties whose choices affect one another. Each party has two choices: to cooperate with the other or to defect/not cooperate. The 2 by 2 matrix here summarizes the “payoffs” (which could be profits) that each party will earn under the 4 possible outcomes.

|              | B cooperates         | B defects            |
|--------------|----------------------|----------------------|
| A cooperates | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |
| A defects    | A gets 5<br>B gets 0 | A gets 1<br>B gets 1 |

The payoff numbers here mean that if both cooperate, each party earns 3 euro (this could be millions of euro). If both defect on their agreement, both earn 1 euro each. However, if one chooses to cooperate but the other one chooses to cheat, then the cheater (defector) earns 5 euro and the one who got cheated on earns nothing. Using the numbers in this example, we apply the concept of a Nash equilibrium to predict what choices each party will actually make if they are aware of all of these numbers (payoffs).

The idea of a Nash equilibrium is as follows:

Party A will say to itself:

- Suppose that B chooses to cooperate, what will be A's best Choice forward. In this example, we can see from comparing A's profits within the first column of numbers (highlighted in red on the next page) that the best choice for A (if B chooses to cooperate) will be to defect (because A will earn 5 versus only 3 if he cooperates).
- Suppose that B chooses to NOT cooperate (defect), what will be A's best choice? In this example, we can see from comparing A's profits within the second column of numbers (highlighted in blue below) that the best choice for A (if B chooses to defect) will be to defect (because A will earn 1 versus zero if he cooperates).

| B cooperates | B defects |
|--------------|-----------|
|--------------|-----------|





|              |                      |                      |
|--------------|----------------------|----------------------|
| A cooperates | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |
|              | A gets 5<br>B gets 0 | A gets 1<br>B gets 1 |
| A defects    | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |
|              | A gets 5<br>B gets 0 | A gets 1<br>B gets 1 |

From i and ii above, we see that no matter what B does, it is always best for A to defect — that is, defecting is a “dominant strategy”. So, we predict that A will choose to defect regardless of what B chooses to do.

Then we go through the same set of logic for B (and come to a similar conclusion about what B will choose to do). Here, we are comparing B’s profits across each row. That is

Party B will say to itself:

- Suppose that A chooses to cooperate, what will be B’s best choice? In this example, we can see from comparing B’s profits within the first row of numbers (highlighted in yellow on the next page) that the best choice for B (if A chooses to cooperate) will be to defect (because B will earn 5 versus only 3 if he cooperates).
- Suppose that A chooses to NOT cooperate (defect), what will be B’s best choice? In this example, we can see from comparing B’s profits within the second row of numbers (highlighted in green on the next page) that the best choice for B (if A chooses to defect) will be to defect (because B will earn 1 versus zero if he cooperates).

|              |                      |                      |
|--------------|----------------------|----------------------|
|              | B cooperates         | B defects            |
| A cooperates | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |
|              | A gets 5<br>B gets 0 | A gets 1<br>B gets 1 |
| A defects    | A gets 3<br>B gets 3 | A gets 0<br>B gets 5 |
|              | A gets 5<br>B gets 0 | A gets 1<br>B gets 1 |

From i and ii above, we see that no matter what A does, it is always best for B to defect — that is, defecting is a “dominant strategy”. So, we predict that B will choose to defect regardless of what A chooses to do.

That is, the Nash equilibrium prediction in this case is that both A and B will choose to defect, and will earn only 1 each. This is a prisoner’s dilemma outcome because both would be better off if they chose to cooperate.





More generally, if we use the following notation:

let CC be the profit earned by each party if both choose to cooperate (so the total profit is  $2*CC$ )

let DC be the profit earned by the defector (cheater) if the other party chooses to cooperate

let CD be the profit earned by the cooperator if the other party chooses to defect (cheat).

That is, the “payoff” matrix is as follows:

|              | B cooperates           | B defects              |
|--------------|------------------------|------------------------|
| A cooperates | A gets CC<br>B gets CC | A gets CD<br>B gets DC |
| A defects    | A gets DC<br>B gets CD | A gets DD<br>B gets DD |

Then, as long as  $2*CC > (DC + CD)$ , the prisoner’s dilemma situation holds, so that using the Nash equilibrium concept, we would predict that both will choose to cheat, even though both would be individually better off to cooperate.