



Opportunities for sustainably competitive Irish agriculture

Some strategic initiatives towards:
“Getting better as well as bigger”

Synthesis Report

Agri-Food Strategy Group September 2015

In association with



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Preface

Long term strategic thinking

The Agri-Food Strategy Group was established in 2014, to initiate a conversation around the premise of national need for longer-term thinking about the future of Irish agriculture and specifically to address the question: ‘what fundamental over-arching strategic initiatives are needed to ensure the continued development of an Irish agri-food industry that is both internationally competitive and resilient?’. With abolition of milk quotas in Europe since April 2015, this question has become one of major strategic importance. This significant change in EU policy opens up new and potentially exciting possibilities for Ireland’s primary industry. Co-incidentally, however, we face significant uncertainties concerning food supply in increasingly globalised markets, and very serious questions about the longer-term sustainability of food production systems.

Becoming more competitive in international markets will require the raising of technical efficiencies and product quality to ensure both the future economic and environmental resilience of the Agri-Food sector. A radical and concerted effort is needed to harness national resources in securing this aim. The rewards for farming, rural regions and the wider national economy are potentially great and in a very real sense, Ireland now has a ‘win-win’ opportunity to adopt a leading role in the development of a ‘smarter’ agriculture. But to rise to this challenge, we need to harness collective vision and wisdom.

In seeking to identify a number of priority measures that might underpin the future success of Irish agriculture, the Agri-Food Strategy Group met on a number of occasions for discussions that benefited from the prior preparation of briefing documents by group members and invited contributors (see Appendix 1). Outputs from these meetings were submitted to the subsequently announced *Food Harvest 2025* public consultation process. This ‘synthesis report’ summarises those commentaries, and draws overall conclusions to provide an objective, and hopefully constructive contribution to an important national debate concerning the improved performance of Irish agriculture in all its economic, societal and environmental dimensions.

We express our gratitude to all participants in this process for their commitment and willing contributions, and specifically acknowledge the role of Grant Thornton in facilitating publication of the group’s output.

Michael Monaghan

Liam Downey

Gordon Purvis

23rd October 2015

Executive summary

The significance of new possibilities for Irish agriculture is well versed and understood. The opportunity to expand food production in Ireland can undoubtedly offer greater rewards, but it also involves considerably enhanced financial risks and significant economic and environmental sustainability issues.

At this critical juncture, Ireland must adopt a ‘smarter’ strategy to ensure the equitable development and longer-term success of its agri-food sector. This will require a radical new model of collective support and enablement in agri-food policy, including the commitment of technical, scientific and educational resources needed to improve the Sector’s performance in all the multiple dimensions of agri-food concerns on the global stage.

A revision to the design of the Common Agricultural Policy (CAP) has a potentially important role to play in stimulating and accelerating the development of solutions to the challenges inherent in food production in the 21st century.

Irish agriculture effectively stands at a ‘tipping point’ in the necessary development of a new approach to food production that can successfully navigate significant technical, financial, organisational and educational challenges.

As a major food exporter with already widely perceived ‘green credentials’, Ireland has much to gain by adopting a leadership role in the improvement of performance in all economic, environmental and societal dimensions of its agriculture.

As it seeks to respond to both market and environmental opportunities and challenges, Irish agriculture needs to prioritise progress and improvement in several *key strategic directions*, and give further consideration to a number of proposed *overarching strategic initiatives*.

Key strategic directions:

1. Better as well as bigger:

Improved farm productivity is a primary imperative in the further development of an agriculture that is internationally competitive and sustainable.

2. Financial sustainability:

Proper financial planning and management of the substantial investments involved in expanding farming and food production is a prerequisite in coping with continued price volatility.

3. Food chain integration:

Closer alignment of food production, processing and marketing is required in overcoming prevailing deficiencies and the sharing of risks and rewards.

4. Environmental resilience:

Realisation of opportunities to expand food production whilst continuing to protect and benefit from Ireland's environmental advantages and in particular, to realize the potential of dairy production without significantly adding to greenhouse gas emissions.

5. Enhanced agri-food education and training:

To address the opportunities and challenges arising, there is pressing urgency to re-appraise the future direction of education and training systems with priority being given to raising the technical awareness and financial capabilities of all involved in farming and the agri-food sector.

Overarching strategic initiatives:

- 1 To reduce the impacts of price volatility and consequential financial risks, active consideration needs to be given to re-orientation of the CAP, to include the active promotion of producer groups, incentivisation of greater food chain collaboration and adoption of food production models that are sustainably competitive;
- 2 To drive innovations in agri-food, early attention needs to be given to the creation of new forms of organizational structures that will enhance the uptake of existing and new knowledge, including where appropriate public-private partnership;
- 3 Irish agriculture needs to set unambiguous, but realistically achievable targets for the improvement of current farming practices with respect to the management of soil fertility, grass production and utilization, and the overall economic and environmental resilience of grass-based ruminant husbandry;
- 4 To reduce production-related diseases in dairy herds, a nationally coordinated programme on ruminant nutrition is urgently required involving enhanced veterinary advisory services and upgraded educational provision in dairy cow nutrition;
- 5 The degree to which genetic, technical and husbandry advances have the potential to reduce the absolute levels of greenhouse gas emissions below the proportional increase in cow numbers needs to be objectively quantified; and
- 6 Given the critically important challenges and uncertainties arising, there is a growing need for the establishment of a knowledgeable group of independent stakeholders to inform future developments in Irish agri-food policy.

Introduction

Global challenges

A number of recent strategy/foresight reports have detailed the formidable array of challenges and uncertainties confronting the agri-food industry and indeed society in general, including globalization of food markets, food security, climate change, environmental sustainability and the future economic viability of rural regions. Responding to these and other emerging international developments will require radically new approaches in agriculture and food production. This is emphatically underlined in a seminal article entitled ‘Solutions for a Cultivated Planet’ produced by a panel of twenty one leading international scientists and published in the journal *Nature*¹. This states that ‘the challenges facing agriculture today are unlike anything we experienced before and they require revolutionary approaches to solving food production and sustainability problems’. Within this context, Ireland’s strategy must be to develop agricultural systems that are both economically competitive and environmentally sustainable.

The abolition of the EU milk quota system, presents an unprecedented opportunity to improve farm incomes and that of the national exchequer. However, this requires that substantial investment be undertaken at a time of marked uncertainties, not least of which is likely increased price volatility. An additional significant challenge is how to realise the opportunities at hand, whilst recognizing that significant changes in global agri-food policy are likely with respect to climate change, the environmental sustainability of food production systems and the public health consequences of human diet. There is an urgent need for the development of more efficient food production systems that can be validated as having lower environmental costs and improved benefits for the consumer compared with those of international competitors.

Principles

In any strategic thinking or planning, there needs to be an overall ‘organising’ theme. In the case of the Irish agri-food sector, we propose the concept of sustainable competitiveness² which demands both economic and environmental resilience in the face of increasing globalisation of food markets, increased price and climatic volatility, and rapidly changing policy in many areas that directly affect the agri-food sector.

The main design criteria for the development of an agriculture that is both economically competitive and environmentally sustainable include the need to be:

- i. profitable at farm level;
- ii. produce market required products;
- iii. meet animal health and welfare needs;

¹ *Nature* (2011) Foley, J.A. et al., vol. 478, 337-342 (DOI: 10.1038/nature,10452)

² Purvis G, et al., 2012. Development of a sustainably-competitive agriculture. In *Agroecology and Strategies for Climate Change, Sustainable Agriculture Reviews* 8; pp. 35-65. Ed E. Lichtfouse. Dordrecht-Heidelberg-London-New York: Springer/Science+Business Media B.V.

- iv. environmentally sustainable;
- v. resilient to climate change; and
- vi. energy efficient.

The concept of sustainably-competitive agriculture is essentially a value-adding approach that seeks to apply the large body of existing knowledge across the disciplines of agriculture, food and environmental sciences, and a targeted acquisition of new knowledge, to achieve sustainable competitiveness. It also provides a useful framework for thinking about the reforms needed to mobilise and apply available knowledge in the development and uptake of systems that confer real advantages for both the producer and consumer, including enhanced food quality, improved animal health and reduced environmental impacts.

1. Getting better as well as bigger

Dairy expansion - a national opportunity

National actions

Dairy expansion post-quota provides a unique opportunity for significant growth in farm incomes, and also the national exchequer. This once in a lifetime opportunity needs to be fully embraced. The establishment of an 'Agri-food Action Board' should be considered. This would operate as a public-private partnership under the aegis of the Department of Agriculture, Food and the Marine, with a CEO to drive towards nationally agreed targets and ensure the coordinated commitment of existing staff and physical resources to the delivery of agreed actions. Such a board would include representatives from all aspects of industry acting as one in the national interest. Funding for nationally agreed strategic actions could be provided, for example, through the Department's Food Institutional Research Measure (FIRM) and STIMULUS programmes, and/or the Dairy Research Levy.

Local action

A complimentary structure involving the establishment of local activation groups may be required at regional, but preferably county-level, to ensure ownership of the actions necessary to support the local expansion of dairying.

Targets for improvement in farming practice

Irish agriculture needs unambiguous, but realistically achievable targets for improvements in farming practice with respect to management of soil fertility, grass production and utilization, and performance gains in grass-based ruminant livestock husbandry. These should keep in mind the necessity to ensure the longer-term economic and environmental sustainability, and current value-adding advantages of grass-based Irish farming.

Improving grass quality and its utilization is a priority. Raising output to an average of ten tonnes dry matter per hectare should be a primary target. This will require that the number of dairy and beef farmers who actually measure their grass production and utilization be increased from presently low levels of less than 10% and 5% to 30% and 20%, respectively. Allied to this, deficiencies in soil management in terms of soil pH, phosphorus and potassium status can and need to be addressed, and inefficient excesses need to be reduced.

The very large ranges in nutrient balance and use efficiency observed at farm level indicates a considerable scope for improvement. A useful approach would be to set individual farm level targets for nutrient (nitrogen and phosphorus) balance and use efficiency. Such individually targeted measures would maximally improve overall efficiency and farm profitability. It would also reduce the impact of unnecessary and inefficient nutrient loss to the environment, resulting in reduction in greenhouse gas emissions and acidification, and improvements in water and air quality and biodiversity.

The associated financial benefit to farmers in achieving such targets would act as a motivating factor, similar to the current Economic Breeding Index (EBI) for genetic merit. The goal should be for soil and nutrient management to be understood as one of the key on-farm improvement factors alongside herd health, fertility, grazing management etc.

Less than half of dairy producers engage in milk recording. By 2025, the target must be that records are kept for all dairy cows.

To improve overall financial planning, the number of farmers completing annual profit monitors and cash flow budgets can, and needs to be doubled

Animal health and nutrition

Production-related diseases

Mismanagement of animal nutrition is a serious impediment to farm profitability that is most seriously evident in the incidence of production-related diseases. As dairy farmers seek to exploit the lifting of quotas, the risk of significant production-related herd health problems is increasingly likely. Realising the potential of work done on animal genetic improvement requires the adoption of appropriate animal husbandry, which focuses on nutrition and disease.

Achievements made in dairy cow genetics in recent decades, need to be matched by the necessary commitment of resources to development and on-farm application of nutritional practice designed to prevent production related disease and improve net farm profitability. To achieve this end, there is a need for a nationally co-ordinated strategy that integrates:

- i. a nationally co-ordinated research programme on ruminant nutrition;
- ii. enhanced integration of veterinary and advisory services in dairy cow nutrition; and
- iii. education at all levels, including Continued Professional Development (CPD), to provide greater understanding and appreciation of the crucial links between cow nutrition, health and performance

Infectious disease risk

For many farmers, dairy expansion will involve the purchase of additional animals. The introduction of diseases, such as Johne's, Salmonellosis, Leptospirosis, Mycoplasmosis, Infectious Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhoea (BVD) and Tuberculosis (TB) into naive herds can have devastating consequences.

A parallel set of risks apply in contract-rearing situations, especially where calves from a variety of owners are reared together and returned to their herds of origin in late pregnancy.

Comprehensive strategies devised at individual farm level are required to manage these risks and should be addressed at the point where herd expansion is first considered.

Advisory and research systems

To ensure the continued sustainability of an agri-food industry that is profitable at farm level and internationally competitive, priority needs to be given to the following strategic initiatives.

Advisory services

To drive innovations in agriculture and food, advisory services need to develop new forms of organizational structures involving where appropriate, public-private partnership. New skills and institutional linkages will be needed to enable advisory services to harness, translate, communicate and support the uptake of the large reservoir of accumulated research knowledge now available.

Advisory services have a crucial role to play in supporting farm families in the preparation of soundly based farm financial plans, which are a pre-requisite to undertaking on-farm investment at a time of increased climatic instability and price volatility.

A sustained commitment of staff and financial resources is required to provide advisory services with the requisite technical and financial capacity to support the agri-food sector in the challenging circumstances now arising.

To raise the innovative capacity of farmers, agriculturalists and the advisory services in meeting to the opportunities and significant challenges presented, there is a pressing national requirement for review of agricultural and food education and training provisions (see below).

Research

Longer-term, thematic research will be essential in supporting innovation in production systems development.

In grass-based production research, much greater emphasis needs to be given to animal nutrition, both from the prospect of reducing production related disorders and mitigating gaseous emissions. This will require an integrated focus to establish greater understanding of the inherent advantages of grass-based ruminant nutrition and environmentally-optimised grass management systems that make best use of natural resources and processes, including nutrient cycling, carbon sequestration and the functional benefits of biological diversity in pasture management.

In food research, the influence of the grass-based production system on food quality attributes, and the potential of emerging technologies to enhance food processes and products need to be systematically assessed and the resulting knowledge incorporated into farmer understanding and practice.

2. Financial sustainability

Improved financial planning

Investment in farm expansion needs to be undertaken during a period characterized by severe price volatility and reduced farm profitability, combined with the overhang of 'on and off-farm' debt. In these circumstances, soundly based financial planning is an imperative both for farmers and lending institutions.

Business skills

Immediate priority needs to be given to raising the requisite skillset of farmers to manage an expanding farm enterprise. Teagasc, agricultural consultants and accountants all have crucial roles to play in ensuring that farmers have the capacity to effectively plan and implement expansion. Support in creation of a farm family plan would make an important contribution to ensuring ownership and success of the undertaking.

The family farm

Most farms in Ireland are family-owned so the cash needs of the farm business drives, many other decisions, e.g. mortgage, childcare, education, succession etc. These dependences need to be factored into every business plan in terms of cash flow and expected profitability. The family farm is a family business. As the family farm scales up for growth, it is important therefore that all the stakeholders understand the potential risks and rewards of farm business decisions.

In this context, it is interesting to note that research shows that 98 per cent of farms are owned by men, whereas financial returns and book-keeping are, in the main, managed by women. In the new era of potential reward and increased risk, where financial skills are at a premium, it is important that the knowledge skills of all the family are recognized and supported to maximize the outcome within acceptable risk parameters.

Pro forma Farm Financial Plans

Lending institutions can make an important contribution by providing clients with a pro forma farm financial plan designed to enable farmers and their professional advisors to show that the farm enterprise has the sustainable repayment capacity to meet the 'reality-check' required by all parties.

Managing Volatility and Risks

Contracted production

Price volatility is a growing concern with respect to the scale of investment required for farm expansion. Alternative production purchasing arrangements need to be evaluated. Contracted production can be mutually beneficial to farmers, processors and financial institutions. In dairying, the Glanbia fixed milk pricing contractual system provides producers with price stability, processors with security of supply and creditors with greater confidence in funding expansion.

Brokerage arrangements

Notwithstanding the reluctance of producers and processors to engage in such arrangements, similar contractual arrangements would do much to reduce price volatility and financial risk in beef production. An honest brokerage system supported by publicly-supported mediation and market monitoring specialists may be required to ensure a clear and transparent system operating to the mutual benefit of contracting parties. While DAFM would not be directly involved, there is potential for department oversight of a market monitoring and mediation service, comprising specialists appointed to ensure that such a clear and transparent brokerage system operates to the benefit of all concerned.

Producer groups

Producer marketing groups developed under forthcoming EU legislation can also make an important contribution. A centralized administration would be required to arrange customers and negotiate prices and sale date. The livestock marts could potentially provide such a service on a commercial basis. Initially small-scale beef marketing groups comprising perhaps five to six producers collectively offering their animals for sale, may serve as a starting point for the progressive development of larger arrangements.

Knowledge exchange and mobilisation

The key considerations in achieving success, relate to connecting the source of research knowledge with the Knowledge Exchange (KE) mechanism. The barriers to effective knowledge mobilisation often result from economic, institutional and/or cultural factors, and most frequently arise at the points of interface between the originators of new possibilities through research, and the KE specialists who translate and communicate new insights and understanding for application by the end-user.

Careful consideration needs to be given to creation of innovative funding mechanisms that will support longer-term, system-focused development of a national agri-food strategy, by directly addressing KE as the key determinant of success.

Funding

The sustained commitment of staff and financial resources to the further development of existing advisory and educational support services in agri-food is a prerequisite. Core public funding is essential in respect of the public good value and benefits of the services needed. Private companies cannot readily capture the wider benefits of a successful national strategy that meets the challenges faced, but never the less, they need to play a key collaborative role in their achievement. This will require a radical rethinking and development of organisational structures and processes within the sector, potentially supported by recent developments at European level (European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI)).

3. Food chain integration

Towards an aligned food business model

The current food production business model lacks significant alignment; it distributes reward across the supply chain without reference to assets employed, financial and operating risks, or responsibility for regulatory compliance. A better aligned business model would as outlined below, ensure that resources are allocated efficiently, and that risks and rewards are shared appropriately. Such mutual interdependence would ensure sustainability. With the expansion now planned, notably in milk production, the current business model of food production needs to factor in the true cost of capital for expansion, and the true cost of climate change.

Capital investment

The financial returns in food production are insufficient to pay for the true costs of the assets employed, particularly at primary producer level. In a no growth scenario of only marginal costs and rewards, important investment decisions can be deferred in a business, creating an illusion that capital investment is unimportant. However, in an expansionary growth context this approach can lead to failure, especially where the capacity to service new debts is limited. In the latter circumstances, it is not possible to maintain the illusion that capital investment is unimportant, once the money has to be paid back. The requirement to invest in order to scale up introduces added risks and also further costs, which will be paid before (not after) all other commitments.

Climate implications

The need to reduce gaseous emissions has been comprehensively documented and repeatedly discussed by the Agri-Food Strategy Group. Regulatory change is needed, which will change how food is produced, particularly at the primary producer level. Such change will inevitably have a financial cost for compliance, and a financial penalty for non-compliance.

Disruptive innovations

The problem of capital for expansion and accommodating climate change is fundamentally economic, and hence the solution must be economically viable. Every member in the food supply chain must be made aware of the economic impact (positive or negative) and consequences of action, or in-action. The requirement to pay the costs of capital and climate change to achieve global growth in food production are among the two most disruptive innovations in food production in the fifty-year period since the Green Revolution – even more so, given that both need to be operationalised at the same time.

Notable innovations do not occur in circumstances where success is not rewarded and failure is seized upon as an opportunity to perpetuate the status quo – food production is not a forgiving business. Unfortunately, the current costs and system of food production, and its relationship to all factors that drive the price of consumption do not leave any room to fund either the true cost of capital or climate.

The incorporation of capital and climate change into modern food production systems raise the following fundamental question: What is the long-term impact of incorporating the true cost of

capital and climate change into the 21st Century system of food production whilst it strives for growth?

Experience in other sectors

In contemplating this daunting challenge, it's important to recognize that other sectors, such as ICT, Pharma, aerospace and the motor industry, have faced comparable changes, and have responded to the challenge by moving towards an aligned business model. This ensures that resources are allocated efficiently, that risks and rewards are shared appropriately, and that mutual inter-dependence ensures continued longer-term sustainability and survival. Instances where such success has been achieved in agri-food projects are detailed below in comments on food chain collaboration.

Food chain collaboration

Food supply chain collaboration has become an imperative to business sustainability, especially with the prevailing volatility of global markets. This is not a new phenomenon. It is already evident in new technology sectors and also in certain longer-term industries. Car manufacture was historically a supply chain based on powerful manufacturers, sourcing components at the lowest possible price with quality taken as a given. Toyota notably changed the world's car manufacturing industry by embracing principles that ensure consistent quality. The company proved that they could reduce their total costs by having capable suppliers partnered with them in a continuous cycle of total process improvement for the longer-term. Consistent quality to end consumers left competitors behind, market share increased, total supply chain waste costs dropped, and profit grew. To become globally successful, other car manufacturers were eventually forced to adopt the Toyota way.

Individual links in the chain

The agriculture and food industry appears to be at a tipping point where supply chain collaboration is now becoming an imperative for success in global markets. The average farm generates poor profits across the globe. Processor profitability is also poor. Suppliers of farm inputs and products make low profits. Scale is increasingly seen as not a protection against risks now being faced.

Major food retailers are giving increased priority to food chain collaboration. In Britain, Marks & Spencer and Waitrose have long-valued their suppliers as an essential part of a quality supply chain. Sainsbury's have invested £60M over the last ten years in building the knowledge base of its 400 direct milk suppliers.

Examples of collaboration

Supply chain collaboration cannot depend exclusively on retailers. Major potential exists prior to the farm, among input suppliers working together and with farmers to achieve more efficient outcomes. In Ireland, the KK Club initiative involving Kepak and Keenans with a select group of Irish beef producers delivered consistent quality beef from grass to meet the stringent requirements of the high value Italian market. Dairygold's feed supply division and Keenans are currently involved in a food chain alliance aimed at raising milk yield by 500 litres per cow within one year, without increasing concentrate feeding above existing levels. Collaborative precision grazing and precision feeding technologies can reduce variations in milk composition as well as the efficiency of grass and feed use, with benefits to processors and farmers.

Targeting new markets

New opportunities in China and the US are creating demand for market specific products. To satisfy these market requirements, current beef production methods need to be modified. The scope to increase weight gain, improve carcass quality and reduce the total number of days the animals are retained on farms, are enormous. A targeted integration of grass nutrition and genetics strategy can deliver what is required. Collaborative food chains are of central importance to achieving this national goal. In this regard, EU Commissioner for Agriculture and Rural Development, Phil Hogan at a recent conference in Kilkenny stressed the crucial importance of integrating collaboration with the use of technology in the further development of European farming systems.

4. Environmental resilience

Towards addressing global food security

The policy-focused approach proposed here, carries forward the significant agri-food-related conclusions and recommendations of the report, Ireland and the Climate Change Challenge: Connecting 'How much' with 'How to' published by the National Economic and Social Council (NESC) in December 2012.

Preparing for the impacts of climate change on global food security requires a radical change in prevailing farming and food production systems. However, farmers have little to gain, at least in the immediate term, from the adoption of farming systems specifically designed to address these concerns. At EU level, a properly informed re-orientation of the Common Agricultural Policy (CAP) could make substantial contributions to addressing food security and supply concerns arising from climate change, by changing imperatives at farm level.

CAP aims

The goal of ensuring food security is consistent with the original purpose of the CAP, namely, in the alleviation of food scarcity in Europe following the Second World War. Although commonly seen as primarily a problem in developing countries, the inadequacies and lack of resilience in global food provision systems have in recent decades become a growing concern for all, including Europe.

Security of food supply, food safety and the human health costs of inadequate diet (including, the increasing costs associated with rapidly increasing incidence of obesity), are growing manifestations of wider concerns within the food system.

Projected climate volatility will substantially exacerbate stresses on the global food system, not only in regions most impacted by climate change, but also in rapidly growing urban centres and countries increasingly dependent on external food supply.

New focus

Relevant stakeholders need to engage with the concept of the CAP, giving increased priority to the support of farming systems that would enable Europe to better and more effectively address the increasingly urgent food-related concerns that will arise from the impacts climate and market volatility.

As an initial step, a scoping report limited to outlining the responses required in terms of farming systems that would be beneficial, particularly with regard to increasing levels of intensification in production systems and greenhouse gas emissions.

Following this, implications and requirements regarding other key aspects of agriculture need to be considered. These include; the socio-economic self-sufficiency of rural communities; the efficiency of land, water and other resource use; energy conservation; the reduction of food waste; human diet and health; and of increasing importance, market demand and consumer requirements.

Continued CAP support

Prioritising an effective response to concerns about the impact of climate change and the security of European food supply would ensure continued support for the CAP as a clear example of the benefits achievable by public/private partnership in addressing these increasingly urgent common concerns.

Greenhouse gas emissions*National responsibility*

Ireland has an ethical responsibility to make an appropriate contribution to reducing Greenhouse Gas (GHG) production. Given its major contribution to national GHG emissions, agriculture must contribute to addressing this demanding goal.

While acknowledging these fundamental principles, group discourse centred on issues pertaining to Ireland's approach to this daunting challenge. Strong doubts exist as to the feasibility of Ireland reducing gaseous emissions from agriculture in absolute terms, while at the same time substantially increasing cow numbers. Many of the concerns arise from the assumptions being advanced to reconcile these conflicting national goals, for instance, in the recent emphasis on the C-sequestering potential of forestry.

Key question

The overarching requirement is for a holistic feasibility study to objectively answer the following question: Can Ireland reduce GHG emissions from agriculture while substantially increasing dairy cow numbers? Priority needs to be given by the national research services to addressing the above question within the immediate term.

Precision feed, fertilizer and grass management technologies/systems could make important contributions to animal productivity, while reducing absolute levels of gaseous emissions. Policy initiatives combined with concerted industry commitment are required to make this a nationally achievable goal.

The crucial requirement in this regard is to quantify the contributions of specific mitigation measures that are realistically implementable in the immediate years ahead, and the pre-conditions required for these improvements to be achieved.

The development of the Teagasc/Bord Bia decision support tool Carbon Navigator represents a laudable advancement in this regard as it provides a means to identify farm-specific actions, that if widely adopted would achieve a significant overall improvement in farming performance.

Other important points highlighted in discussions included:

- a) consideration of gaseous emissions needs to be broadened from the focus on the farming sector to wider food production, including all aspects of food processing and the export chain. This would position Ireland as a sustainable supplier of food;
- b) the carbon footprint of food production needs to be expressed as absolute emissions rather than in relative or intensity metrics, such as kgs C/litre of milk;

- c) a reduction in suckler-cow numbers has the potential to make a significant contribution to accommodating the increase in GHG emissions associated with an expansion of dairy cow numbers;
- d) increased afforestation could raise Ireland's potential to sequester carbon. However, newly established forest sinks are unlikely to yield sufficient offsets in the next ten years; and
- e) significant scientific evidence suggests that the C-sequestration potential of pastures merits much greater attention.

On-going focus

The degree to which genetic, technical and husbandry advances have potential to reduce the percentage increase in emissions below the proportional increase in cow numbers needs to be objectively quantified, and should be an on-going focus of research efforts.

5. Re-appraisal of agri-food education and training systems

Why is a forward-looking review needed

National strategy to expand agricultural production following the abolition of EU dairy quotas, whilst also responding to changing market demands and environmental needs, provides the agri-food sector with a major challenge. At this critical 'tipping point', re-evaluation of educational provisions is needed to ensure that the next generation of farmers, agriculturists and others engaged in the food chain are provided with the capacities and knowledge needed for development of a multi-functional agriculture that is both competitive in international markets, and successful in addressing increasingly pressing concerns regarding food quality, environmental issues and the economic viability of rural communities.

Requirements for a multi-functional agriculture

As outlined in the Introduction, the performance criteria for a successful multi-functional agriculture, include the need to be:

- i. profitable at farm level;
- ii. produce market required products;
- iii. meet animal health and welfare needs;
- iv. environmentally sustainable;
- v. resilient to climate change; and
- vi. energy efficient.

These criteria will be the co-determinants of future success in global food production, meaning they are the foundation blocks upon which future education and training need to be developed at all levels in the food chain. A novel feature of this approach is its recognition of the need for a single unified agri-food knowledge system, and the central role that education and training systems must play in achieving this key national objective.

Inadequate uptake of knowledge

The relative up-take of well-established best practices that can significantly improve performance at the farm level, for example financial planning/analysis, recording of milk yields, improvement of soil fertility and pasture management, quality control in silage production etc., continues to be poor. Lack of up-take of current best practice frequently limits capacity to progress and improve and is a major impediment to the concept of 'getting better'. The question of technological absorptive capacity, or resistance there to, is therefore an issue of major strategic concern.

The learning process

Educational policy development needs to be underpinned by a deeper understanding of the reasons why apparently obvious means of improvement are resisted. Can we benefit from a better understanding of how the learning process works? In this context, four insights from the cognitive and behavioural sciences may be useful.

Social capability

Major change can be socially difficult and disruptive. There are strong forces making for persistence in the effects of past choices, 'old habits die hard'. Deeper elements of established culture can also limit responsiveness to new opportunities, including deeply ingrained institutions and organisational structures. In agriculture, EU intervention, fixed farm payments, production quotas and land ownership issues may all contribute to a resistance to change.

The learning paradox

There is a close association between education, skills level and success. However, it is often only on the basis of having learnt a little, that the need to learn more can be fully appreciated. A relatively poor level of existing knowledge in key new areas, will then constrain the capacity to progress and improve. This paradox can only be addressed through an all-round improvement in basic understanding. In the first instance, this approach would benefit from the benchmarking of existing knowledge with respect to the agri-food performance criteria listed above, and comparison with educational provisions that successfully improve knowledge levels elsewhere.

The ability to network

There is a vast resource of external knowledge now available to all participants in the agri-food sector. The new knowledge needed to drive innovation will largely come from external sources, and sustainable improvement in the performance of Irish food production will depend largely on improved access and use of this knowledge. The capacity to establish relationships with other knowledge users for mutual benefit, i.e. to establish innovative collaborations with others engaged in the food chain, will be critically important to the future success of Irish agriculture.

Codification of knowledge

Acquiring external knowledge requires the establishment of relationships, but it usually also requires that new knowledge be codified and contextualised before it can be fully understood. This is a fundamental step in Knowledge Transfer (KT) and a key part of the wider educational framework. It is often only when new, increasingly specialized knowledge is incorporated into formal systems development, that its benefits can be effectively communicated as acquired knowledge. This requires optimisation of the links within and between the agencies involved in knowledge generation, extension services and educational provision.

Vocational education and training for farmers

Education and training programmes must equip prospective farmers with technical understanding, business management skills and the ability to realise new opportunities. The overarching strategic goal should be to get farmers to 'think food'. Provision of an appropriate balance of farming, food and environmental knowledge will be key to their future success. In an era where information is readily available, developing the capacity to source, evaluate and apply relevant knowledge will be a critically important skill.

Participants in Teagasc programmes vary considerably in the scale and intensity of their farming interest, their level of programme participation (full-/part-time), existing knowledge and learning abilities. Key questions include:

- what minimum core level of knowledge, skills and competency requirements is required to meet the needs of future entrants to farming, regardless of their production system?; and
- over and above these core competencies, what additional knowledge-skills are needed to upgrade and equip progressive farmers with the capacity to improve and further develop their enterprise, and how can these requirements be best provided for?

Future directions of third-level education for agriculturalists

There is a clear need for future generations of agriculturalists to have a fuller, integrated understanding of the technical advances that will underpin future success in food production. At its very core, multi-faceted agri-food education must provide an integrated understanding of the inter-dependencies between food, business and environmental interests.

New approaches to teaching and learning

It is vital for educators to recognize the limitations of the conventional ‘nutritional model’ of education, in which learners are fed information and tested on their capacity to recall it. Many students respond poorly to this approach and do the minimum needed to pass tests. Well-established educational methods that can transform this behaviour and encourage the integration of knowledge from different domains deserve much wider application. Any re-appraisal of third-level education must consider new approaches to teaching and learning. This should:

- 1 include a robust critique of current teaching methods;
- 2 take account of diverse learning styles and abilities;
- 3 identify appropriate entry-levels of knowledge & competencies for each learner category;
- 4 recognise that provision of information does not equate to knowledge acquisition;
- 5 foster self-sufficiency and critical thinking in the sourcing and evaluation of information; and
- 6 acknowledge the importance of social learning and ensure graduate capacity for collective learning and mutual collaboration.

Inculcation of a market-orientated, valued-added mind-set

In establishing a new strategic direction for Irish agriculture, education programmes need to foster and promote a deeper understanding of the inherent production system benefits and marketing advantages to be gained from the enhancement of product quality, systematic improvement of animal health and welfare, sustainable use and protection of natural resources.

Capacity for continued learning and professional development

In meeting increasingly diverse challenges in food production, agri-food education needs to be understood as an on-going process of professional development. This requires that education programmes place much greater emphasis on the capacity for critical thinking and ‘self-learning’, and that careful consideration is given to the provision of career-long educational opportunities in all agri-food sectors through Continued Professional Development (CPD).

Re-invigoration of advisory services

Farm advisory services are a significant component of the organisational landscape within agri-food, and are increasingly seen as being at least as important as technological developments within the Agricultural Knowledge and Information System (AKIS). In supporting a significant re-orientation of the agri-food sector for the post-quota era, careful attention needs to be given to the role that re-invigorated extension services can play, and to the consequential educational and training needs of advisory staff.

Benchmarking

The further development and up grading of education and training in the rapidly changing agri-food sector requires a critical evaluation and comparison with educational responses and developments elsewhere. Such an undertaking would greatly benefit from the engagement of a global perspective. With its strong record of positive engagement in the review of national science policy, its long-established Standing Committee on Agriculture and its proven record of interest in agri-food education, the OECD could play a highly credible role in such an exercise. The OECD has only very recently published a draft framework for Analysing Policies to Improve Agricultural Productivity Growth Sustainably³ This highly relevant OECD initiative will, amongst other things, focus on 'capacity building' and specifically take into consideration the development of 'education and skills policy'.

The feasibility of seeking OECD engagement in a benchmarking exercise on the future direction of Irish education and training for farmers and agriculturists merits further exploration. Such an exercise would position Irish agriculture in the vanguard of agri-food policy development.

³ OECD Draft Framework, December 2014 [available at URL: <http://www.oecd.org/tad/agricultural-policies/Analysing-policies-improve-agricultural-productivity-growth-sustainably-december-2014.pdf>]

Conclusions

Implementation

At this critical juncture, Ireland must adopt a ‘smarter’ strategy to ensure the equitable development and longer-term success of its agri-food sector. This will require a radical new model of collective support and enablement in agri-food policy, including the commitment of technical, scientific and educational resources needed to improve the sector’s performance in the multiple new dimensions of agri-food concerns on the global stage.

To achieve this, the sector needs to develop more innovative and effective ways of engaging with the political system, both at home in Ireland and at an EU level. This can be done by:

- 1 initiating dialogue between like-minded business organisations, NGOs (IBEC and IIEA etc.) and academia, to provide sound scientific and economic justification and support for agri-food policy that addresses food security and other highest priority public good concerns;
- 2 actively engaging with networkers at EU level to advance the concept of CAP giving increased priority to urgent food supply issues, and so becoming a primary framework through which Europe addresses truly global concerns;
- 3 utilising media outlets to orchestrate and showcase the benefits to the Irish agri-food sector, of taking a leadership role in this critical aspect of agri-food policy development; and
- 4 linking with agri-food companies who export to countries most affected by adverse climate change and consequent food supply concerns, and who therefore best understand the need for urgent action in development of resilient food production systems.

Some expected benefits

As a major food exporter with already widely perceived ‘green credentials’, Ireland has much to gain by adopting a leadership role in the development of new models of food production, with the development and adoption of strategic crop and livestock husbandry practices that improve performance in all economic, environmental and societal dimensions of its agriculture.

Low carbon Irish food exports can provide a defining market advantage in an expanding global food economy. Ireland is also well positioned to capitalise on its existing track record in supporting the developing countries, which are likely to be most impacted by climatic and market volatility. The benefits to be gained are strategic and will give a premium rating to Irish agri-food exports, leading in time to higher farm gate prices. This strategy will place Irish agriculture at the forefront of international policy development and carry a considerably reduced risk of penalties for failure to meet international obligations.

Appendix

The Agri-Food Strategy Group was formed with the objective of developing a strategic perspective on Ireland's agri-food industry in the radically changing circumstances in which the sector will need to operate in the immediate years ahead. The Group comprised knowledgeable participants with long experiences in the sector or in more broadly based policy analysis, and additionally benefited from presentations made to the Group by invited contributors, who informed and stimulated Group discussions.

Tom Arnold (DG, IIEA)

Jimmy Burke (Crop Science, UCD)

Patrick Burke (Partner, Grant Thornton)

Joe Cogan (Technology Transfer)

Liam Downey (former Director Teagasc)

Alex Evans (Dean of Agriculture and Food Sci., UCD)

Michael Fitzgibbon (Science Policy)

Michael Hamell (Environment)

Martin Kavanagh (Veterinarian)

Gerard Keenan (MD, Richard Keenan & Co.)

Mike McGann (Farmer/Chair Animal Health Ireland)

Michael Monaghan (Head of College Agriculture, Food Science & Veterinary Medicine, UCD)

Lance O'Brien (Head of Foresight, Teagasc)

Dermot O'Doherty (Science Policy)

Derry O'Donovan (Financial Services/Agriculture)

Mat O'Keefe (Farmer/Editor Farmer's Monthly)

Gordon Purvis (Environment and Sustainable Agriculture, UCD)

Brendan Riordan (Economist/Policy Analysis)

Pat Wall (Public Health and Food Safety, UCD)

Contributors to group discussions

Aidan Cotter (Bord Bia)

Dan Courtney (GHG Emissions, NUIM/Teagasc)

Ann Derwin (Department of Agriculture, Food and the Marine)

Gary Lanigan (Gaseous Emissions & Environment, Teagasc)

Mairead Lavery (Role of Women in Agriculture, Farmers Journal)

Paul Murphy (Nutrient Management and Environment, UCD)

Tony Pettit (Head of Education, Teagasc)

John Sweeney (Climate Change, NUIM)