

The Demand and Supply of Skills
in the **Food Processing Sector**

Expert Group on
Future Skills Needs

to the Tánaiste, and Minister for
Enterprise, Trade and Employment
and the Minister for Education
and Science

Forfás 

The Demand and Supply of Skills in the Food Processing Sector

To the Tánaiste and Minister for
Enterprise, Trade and Employment
and to the Minister for Education
and Science

Foreword by Dr Danny O’Hare, Chairman, Expert Group on Future Skills Needs

This report is submitted by the Expert Group on Future Skills Needs to Mary Harney, T.D., Tánaiste, and Minister for Enterprise, Trade and Employment and to Noel Dempsey, Minister for Education and Science. It was prepared as part of the ongoing work of the Expert Group in looking at the future skills needs of key sectors in the Irish economy.

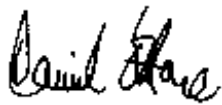
Although the food processing sector is not one for which employment growth is forecast – indeed it is expected to experience a decline over the period to 2007 – it will continue to represent a significant sector in Ireland, both as employment provider and as a major exporter. It is all the more important therefore that those continuing to work within the sector are well equipped with the education and skills needed to deal with an increasingly competitive environment. We believe that this report provides some useful signposts for the sector, both in terms of general strategic direction and specifically in regard to the actions needed to ensure that, as far as skills and education are concerned, both the analysis and the provision of education and training are finely geared to meet future market-place requirements.

The report identifies an unusually large number of drivers of change facing the industry, even by today’s standards of rapid change for all sectors. These changes are diverse – the effects of international policy within the EU and WTO in reducing domestic supports and creating greater import competition in EU markets; the rise in purchasing power of the multinational retail sector; and the continuing evolution in consumer demands and preferences, are just three examples of this. The report analyses the implications of these changes and how they will be reflected in trends within each of the eight sub-sectors studied.

The report also considers the current position in regard to education and training provision and the extent to which this is meeting workplace requirements for the food sector. It provides some useful comparative information on practices regarding education and skills provision for the sector in Denmark and Finland. It addresses the need to give particular consideration to training provision for immigrant workers within the sector. Finally, it makes a series of recommendations aimed at ensuring that the industry will be geared to meet the challenges facing it by having available a well-trained workforce, possessing the new kinds of skills mix the rapidly changing circumstances demand.

There are two key messages contained within the report. The first is that the traditional short-term operational focus of management within the sector, albeit for understandable reasons, will no longer be adequate to counter the threats facing the industry. Management within the sector needs to adjust without delay if it is to meet, and anticipate, the constantly evolving marketplace requirements. Second, the quality of the industry’s liaison with the education sector needs to be improved, in order to respond effectively to the kinds of curricula changes and industry placement arrangements that are now required if we are to equip future employees with the skills and knowledge that they will need to make the industry prosper. Most of the specific recommendations contained in the report reflect these two underlying issues to be addressed. There are, of course, notable and highly successful exceptions to these general concerns – companies which by any standards are world-class in their approach – but there need to be many more. We would hope that these exceptional companies will be looked to by way of example in addressing the wider situation.

I would like to thank the members of the Steering Group who guided the work and Kay Hallahan of Forfás who chaired the Steering Group and without whose dedicated management of the project this publication would not have been possible. I would encourage the speedy implementation of the recommendations the report makes, so that we can ensure that the food processing sector is in the best possible position to succeed in the future, thanks to the calibre of its management teams and workforce.



Dr Danny O'Hare
Chairman

Expert Group on Future Skills Needs

Contents

The Demand and Supply of Skills in the Food Processing Sector

Section 1:	Executive Summary – Key Findings, Conclusions and Recommendations	4
------------	---	---

Research & Analysis – Demand-side

Section 2:	Overview of the Irish Food Industry – Key Drivers-of-Change and Implications for Food Processors	14
Section 3:	Profile of Key Sectors within the Irish Food Industry and Assessment of their Training Needs	35
	3.1 Dairy Sector	35
	3.2 Meat Sector	37
	3.3 Fruit and Vegetable Processing Sector	39
	3.4 Grains & Starches Processing Sector	41
	3.5 Bread, Biscuits, Sugar, Chocolate and Sugar Confectionery	42
	3.6 Bread Sector	43
	3.7 Food Ingredients	45
	3.8 Prepared Consumer Foods (PCF)	47
Section 4:	Irish Food Processing Industry – Projected Skills & Training Needs Assessment	49
Section 5:	Current Levels of Training and Constraining Factors	62

Research & Analysis – Supply-side

Section 6:	The Provision of Educational Courses for the Food Processing Sector	70
Section 7:	The Provision of Training Courses and Services for the Food Processing Sector	85
Section 8:	Education and Training Services in Denmark and Finland – Key Lessons for Ireland	88

Findings, Conclusions & Recommendations

Section 9:	Recommendations for an Integrated Human Resources Development Strategy for the Irish Food Processing Industry	101
------------	---	-----

Appendices

Appendix 1.1	Reports Published by the Expert Group on Future Skills Needs	115
Appendix 2.1	Expert Group on Future Skills Needs – List of Members	116
Appendix 3.1	Food Processing Study – Steering Group List of Members	117
Appendix 4.1	Extract from The Ministerial Task Force on Training & Employment in the Irish Seafood Industry Report 2001	118
Appendix 5.1	Profile of Food-Related Undergraduate Courses Provided by Third Level Institutions in Ireland	125
Appendix 6.1	Public Providers of Training	157
Appendix 6.2	Private Providers of Training	165
Appendix 7.1	Education and Training Services in Denmark – Key Lessons for Ireland	190
Appendix 7.2	Education and Training Services in Finland – Key Lessons for Ireland	210

1. Executive Summary – Key Findings, Conclusions and Recommendations

1.1 Introduction

Utilising a major renewable natural resource, the Irish food processing industry is a vital sector of the economy in terms of output, employment and exports. However, in the rapidly changing landscape in which the industry operates, the sector is set to face significant challenges going forward. These challenges will include increasing market liberalisation, greater intensity of competition, changing consumption patterns, and rapid developments in food processing technology.

Responding to such challenges will be demanding in terms of the skills and expertise that the industry will require in the future. It is against this dynamic background that this study on the Demand and Supply of Skills in the Food Sector has been undertaken.

1.2 Study Objectives

The main objectives of the study were to:

1. Review the key factors which will impact on the different food processing sub-sectors, and examine how these critical drivers-of-change impact on skill requirements.
2. Examine the type of skills required to meet the needs of the food processing sector as a whole and its subsectors, taking the identified drivers-of-change into account.
3. Review the existing training provision within the food processing sector and evaluate its relevance and adequacy to meet the skill needs of the sector going forward.
4. Identify the leading training providers and assess the extent of gaps and overlaps in current training provision.
5. Recommend a national policy framework for the development and implementation of a Human Resource Development Strategy for the food processing industry.

1.3 Project Scope

The sub-sectors of the food processing industry examined in this study are:

- dairy
- meat
- fruit and vegetable processing
- grain and starches processing
- biscuits, sugar, chocolate and chocolate confectionery
- bread
- food ingredients
- prepared consumer foods.

The Terms of Reference for this study excluded the seafood sector from detailed analysis because the training needs and recommendations for seafood processing training are clearly outlined in the Ministerial Taskforce on Training and Employment 2001 (Appendix 4.1) and BIM's Integrated Training Plan for the Irish Seafood Industry 2000-2006.

The Drink and Tobacco sectors have been excluded from the scope of this study, given the study's particular focus on the food-processing sector.

1.4 Methodology

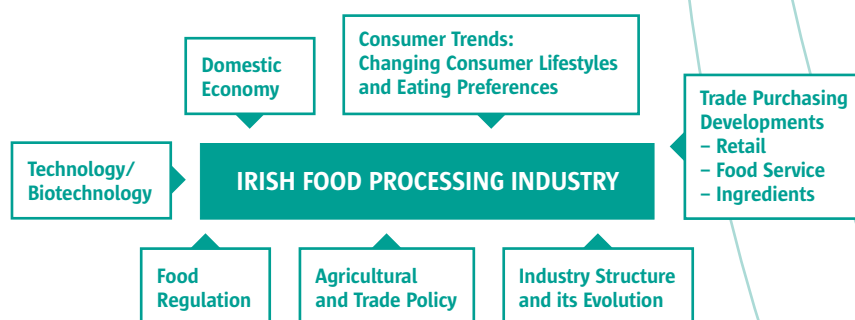
This included:

- comprehensive review of existing studies and reports, on Training/HRD in Irish industry generally and in the food sector specifically, and on issues and developments likely to impact on the food industry over the coming years.
- widely consultative series of meetings and interviews with all relevant state and semi-state organisations with an involvement in the development of the food processing sector.
- an extensive industry survey, with a company response rate covering 40% of all employees involved in the food sector.
- a workshop with leading players from the food sector, third level education, state and semi-state training organisations and training providers to examine and validate survey findings.
- a series of one-to-one personal interviews with leading food company executives.

1.5 Food Industry Drivers-of-Change

The food industry is facing a variety of significant challenges over the coming decade. These challenges are arising as a result of the interaction of a number of significant drivers-of-change. Figure 1.1 presents a summary of the main drivers-of-change considered in this report.

Figure 1.1: Summary Overview of the Key Drivers-of-Change



While it is difficult to predict the precise effect of these drivers on each of the individual sub-sectors of the food industry, the direction of change for the overall industry is reasonably clear. The food industry of the future will be characterised by:

- a greater degree of market liberation
- higher levels of food regulation
- greater intensity of competition
- more consolidation across all sectors
- market-led rather than production-driven

- increasing sophistication of both trade buyers and consumers
- higher levels of technology
- more demanding and greater fragmentation among consumers.

These forces are likely to result in a much more demanding competitive environment and, as a result, different and higher levels of skill will be required to compete successfully.

1.6 Projected Skills and Training Needs

Total employment in the food processing industry was just under 40,000 in 2002, or 15% of total industrial employment. While significant employment growth is not anticipated, the food industry's training needs are very significant in the national context. Based on the methodology outlined above, a number of critical skill gaps were identified, as set out in Figure 1.2.

Figure 1.2: Summary of Critical Gaps Identified in the Food Processing Sector

SKILLS AREA	CRITICAL GAP
R&D/NPD/Quality Control Skills	<ol style="list-style-type: none"> 1. Skills needed to commercialise NPD* 2. Product Research/NPD Skills
Processing Skills	<ol style="list-style-type: none"> 1. Operative Skills (existing technology) 2. Operative Skills (new tech/process) 3. Production Supervisory Skills 4. Operative Skills (craft workers)
Sales and Marketing Skills	<ol style="list-style-type: none"> 1. Marketing Skills 2. Language Skills 3. Negotiation Skills 4. Category Management Skills
Support Skills	<ol style="list-style-type: none"> 1. Training Skills 2. IT Skills** 3. Business Planning Skills

* *New Product Development.*

** *Specifically, supply chain management and logistics.*

Given the drivers-of-change and likely future direction of the food industry overcoming these skills deficits is critical to the future development of the sector.

1.7 Training Constraints

The Irish food industry has traditionally been characterised by a low propensity to invest in training; this has been confirmed by the survey undertaken for this report.

Five distinct barriers-to-training categories were identified – the two tables presented below summarise the key elements of these barriers and their relative impact on the industry's propensity to train.

Figure 1.4 details potential barriers at company or organisational level. Chief among these are managements understanding of the role of training and the direct and indirect costs of training. The disruption to business caused by staff unavailability as a result of them attending training courses is also a considerable barrier to training. This is particularly so as most food companies are SMEs and accordingly, do not have spare staff capacity to cover for such absences.

Figure 1.4: Organisational Barriers to Training

	Relative Impact		
	High	Medium	Low
Demand	Availability of suitable courses	✓	
	Quality guarantee of course	✓	
	Availability of training locally		✓
	Lack of centralised information on courses/training providers		✓
Supply	Indirect costs	✓	
	Direct Costs	✓	
Policy	Grant aid allocation criteria	✓	
	Grant aid application process		✓
	Confusion with respect to role of relevant state agencies		✓
	Immigrant workers – language barriers		✓
	Poor literacy/numeracy skills		✓
Company Specific	Disruption to business	✓	
	Staff retention – post training		✓
	Management understanding of the role of training	✓	
	Demand for training not prompted by employees		✓

Source: PwC industry survey & interviews with cross section of food processing companies.

At industry level, there are also certain inherent features or characteristics pertaining to the food processing sector that influence the extent to which training is undertaken. The main industry-level barriers are presented in Figure 1.5 below.

Principal among these are the short-term operational focus of the industry which is also intertwined with its acknowledged weakness in strategic planning, again with some notable exceptions. Furthermore, in general terms, there is not a clear link between strategic plans and their HRD implications.

Given the commodity orientation of the sector, management focus is on cost control and efficiencies with little emphasis being placed on the strategic development of the business. This approach militates against investment in staff development and training.

Figure 1.5: Pan-Industry Constraints on Training

	Relative Impact		
	High	Medium	Low
Pan-Industry Constraints	Seasonal nature of production		✓
	Commodity nature of output	✓	
	Regional location		✓
	Shift workers		✓
	Large number of SMEs		✓
	Short-term operational focus	✓	
	Weakness in the area of strategic planning	✓	
	Strategic plans not including/ prioritising training plans	✓	

Source: PwC industry survey & interviews with cross section of food processing companies.

1.8 Education for the Food Sector

Some 23 undergraduate third level courses at certificate, diploma and degree level of direct relevance to the food industry were identified and profiled. These courses typically produce between 500 and 600 graduates annually. In addition, some 19 courses at postgraduate level were examined. Student destinations, in terms of first jobs upon graduation, were also studied. Arising from this process, and noting the industry survey and workshop findings, a number of key points emerged.

Firstly, in 2000, only 40 of 189 agri- and food-related graduates who responded to a HEA survey of graduates' first destination of employment, indicated that they entered the food, drink and tobacco sector. In total, less than three percent of graduates from all disciplines entered this sector. The remaining graduates from this discipline were employed across a range of industry sectors such as financial services, retail distribution and the pharmaceutical sector. Secondly, there is a heavy Science/Technology orientation to third level education with virtually all courses being organised along functional specialist lines. There are no broad-based general food management courses. Thirdly, the popularity of food-related courses, as measured by student CAO preferences, is declining.

This study did not identify evidence to suggest that the number of places on the food related third level courses needs to be increased or decreased – instead the industry's ability to attract such graduates needs to be greatly enhanced.

The relatively low level of graduate interest in the sector, combined with the small graduate intake by the industry, reflects the poor image of the food industry among graduates and, over the longer term, poses a serious challenge to the sector, in terms of the management capabilities and intellectual capital available to the industry.

To address some of the underlying factors involved, a new body entitled the Innovation-in-Education-Exchange is proposed. While recognising that there may be a certain amount of resistance to the creation of any new structure at national level, and in the awareness that some individual colleges have strong links to local industry, the Expert Group believes that, with appropriate terms of reference and energetic members, this body would have the ability to radically change the third level/industry interface and to significantly improve the quality of graduates and their relevance to industry going forward. There are at least five specific objectives for this Exchange.

- (a) To improve the relevance of third level curricula to industry and to keep colleges abreast of industry issues and graduate requirements;
- (b) To overcome local and regional variations in terms of the quality of education-industry interaction and allow the setting of a common, national agenda on curricula development. This process will also enable colleges to make fully informed decisions on identifying their own distinctive educational niches;
- (c) To formulate a strategy to enhance the image of the food industry as an attractive career opportunity for third level students;
- (d) To develop a national Code of Practice for student work placements and ensure industry commitment to the process;
- (e) To allow an exchange of ideas on R&D projects and postgraduate research opportunities.

1.9 Training for the Food Sector

There are an estimated 110 training organisations involved in providing specific programmes for the food sector. Approximately six percent of these are public sector bodies with the balance being private sector companies.

Both the training providers and training courses available are essentially concentrated around the Food Hygiene, Food Safety and HACCP/ISO areas, reflecting the impact of legislation and regulation as a driver of training in the industry. Almost 80 percent of 400 identified courses are centred on these areas. Virtually all of the training courses available are short (1-3 day type) courses and workshops, as opposed to certificate or diploma programmes.

Conversely, there is a generally low level of availability and interest in training in many strategically important skill areas such as new product development, operations management and customer relationship management. This reflects the industry's short-term operational focus.

Most of the public sector training programmes are nationally accredited. This is not the case for private sector programmes. However, there is a significant drive underway to accredit all training programmes, in line with the proposed national qualifications framework.

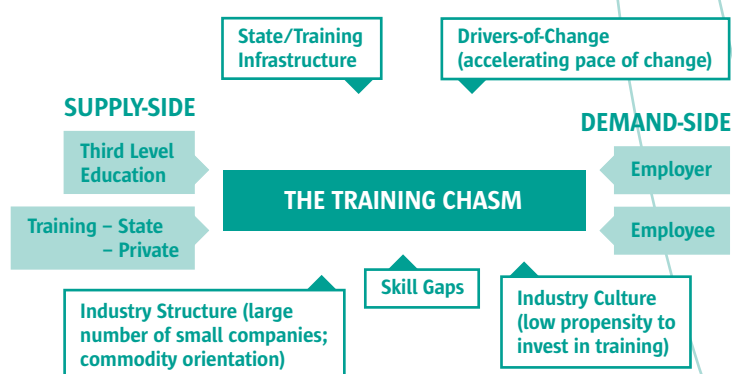
1.10 Denmark and Finland – Lessons for Ireland

In examining the educational and training provision for the food sector in Denmark and Finland, the following points are worth noting:

- A dual track approach is in place in both second and third level education, facilitating both vocational/technical education as well as mainstream academia.
- In particular, the second level education system facilitates specific food industry career opportunities.
- There is a strong partnership approach between employers and trade unions in the apprenticeship systems and their collective commitment to employee development and training.
- There is heavy investment in specific priority areas of the food industry, such as Finland's Tekes €50 million R&D programme in functional foods, food chemistry and biotechnology.
- Strong, well established linkages exist between industry and educators. These links facilitate effective R&D and dissemination and commercialisation of research findings. They also make a significant contribution to curricula development.

1.11 The Training Chasm

Given the drivers-of-change, and the accelerating pace of change in the international food business, there is an increasing business imperative to invest in training. However, despite these incentives, there is a low level of commitment to training across the Irish food sector generally.



While the recommendations in the report address both supply-side and demand-side initiatives, as well as the development of the state/training infrastructure, it is critically important to recognise the central role of senior management commitment to training, if meaningful levels of training are to be undertaken. The industry has a clear responsibility to develop its management and staff in line with evolving industry and business requirements. Management must recognise and accept its responsibility in strategic HRD, given its central role in successful corporate development. In this regard, management, more than any other stakeholder in this process, has to play the lead role in crossing the training chasm.

1.12 Recommendations

Based on the research, and noting the overall food industry context, five strategically important areas of initiatives were identified as critical to the future skills development of the food industry.

These recommendations are framed by the following vision for the Irish food industry, and underpin the critical strategic role of HRD within the industry's development.

Vision for the Irish Food Industry:

The Irish food processing industry of the future will be:

- innovative, market-led and consumer oriented
- a dynamic, attractive and high profile sector, highly valued by employees and the public generally
- attracting the best potential employees at all levels by providing excellent career paths and career development opportunities
- led by senior management that are strategic in their approach and committed to ongoing staff development
- delivering competitive returns on investment.

EMPLOYER FOCUSED INITIATIVES

Recommendation I

- (a) The food industry needs to adapt a more strategic approach to its corporate development and, accordingly, to recognise the importance of strategic Human Resource Development (HRD) in underpinning and delivering on business plans.
- (b) Companies need to be better informed on the importance of the HRD – strategy link. This is a key role for Enterprise Ireland Development Advisors.
- (c) An Executive programme for senior management, concentrating on strategic management in the food industry, should be developed, in consultation with Enterprise Ireland and FÁS.
- (d) A co-ordinated communication programme needs to be developed, by Enterprise Ireland, FÁS and IBEC, to inform and convince management of the importance of training in moving their businesses forward.

Recommendation II

A specific awareness campaign should be undertaken to promote the value of senior management training within companies, in order to position them to respond to the drivers-of-change.

Recommendation III

Individual companies should work, in consultation with ICTU, to bring about:

- Greater resource commitment to the HR function
- Formalisation of the recruitment process
- Development of precise job specifications
- Formalised induction programme
- Continuous appraisal and assessment to facilitate career development.

Recommendation IV

IBEC, in conjunction with Teagasc and third level colleges, should initiate an image development programme for the food sector, communicating its attractiveness as a career opportunity. It should have a particular focus on attracting second level students into (a) relevant third level food courses and (b) food sector employment.

Recommendation V

A Graduate Food Fast Track Training Programme, centred on in-company experience and complemented by formal, external modules on critical topics, e.g. food safety, team-working, should be developed by the relevant education and training providers for the full range of food companies and sectors. The programme should highlight the benefits at employer level.

EMPLOYEE FOCUSED INITIATIVES

Recommendation VI

IBEC and ICTU should jointly undertake the promotion and encouragement of life-long learning to employees, with better communication of both training needs and expected benefits.

Recommendation VII

A promotional campaign on the benefits of training and accreditation, targeting employees should be undertaken by ICTU.

THIRD LEVEL EDUCATION INITIATIVES

Recommendation VIII

A National Innovation-in-Education-Exchange (IIEE), consisting of members drawn from the third level sector and from industry, should be established to ensure that college curricula development takes industry requirements more fully into account.

Recommendation IX

Third level colleges should ensure that:

- (a) At undergraduate level, all food-related courses include modules on food hygiene and food safety, and
- (b) In science and technology subjects, interpersonal/people/team-working skills are enhanced via teaching methods used.

Recommendation X

Consideration should be given by third level colleges to supplying graduate intake into the food sector possessing general management skills covering the three main functional areas of food science, business and engineering.

Recommendation XI

A structured, formally defined programme of activities for work placements should be developed as a central, examinable element of certain undergraduate programmes. The IIEE should initiate this recommendation. Elements of this would be:

- (a) A code of practice for work placements
- (b) Domestic and overseas work placements to be further developed, in partnership with industry, to enhance student experience
- (c) Grading/examination of such placements to be introduced, cognisant of the difficulties of validating in-company experience.

Recommendation XII

- (a) Where appropriate, existing postgraduate programmes should be adapted by third level colleges to include core modules on commercialisation of Food NPD and Food Sales/Marketing.
- (b) A course should be developed in functional foods/nutrition/medicine. (Significant work is already underway in NUI Cork in this area – it may be possible to build on this initiative).

Recommendation XIII

Science Foundation Ireland (SFI) should be requested to explore a Food Technology/Biotechnology/Medicine/Nutrition R&D programme – possibly as an element within the Biotechnology Programme.

Recommendation XIV

The Department of Agriculture and Food and Teagasc, in conjunction with IBEC, should review the approach and methods used to disseminate State and EU sponsored food industry research, with a view to improving communications with industry, technology transfer and industry responsiveness.

Recommendation XV

The IIEE should seek to stimulate debate on:

- (a) The introduction of a programme at Applied Leaving Cert level, focusing on basic/elementary management principles
- (b) Programme(s) focusing on food science/processing, with a significant practical focus.

Recommendation XVI

The IIEE should seek to stimulate debate on the introduction of programmes (cert/diploma) at IT level which would focus on the practical/theory/business skills associated with the craft sectors of the food industry, such as meat and dairy (cheese) processing.

TRAINING INITIATIVES

Recommendation XVII

In response to the skills gaps identified, the development agencies (FÁS and Enterprise Ireland) in conjunction with Teagasc and third level institutions, should, as appropriate:

- (i) Develop, expand and promote courses for beginner/intermediary/advanced companies on R&D Innovation Management, HACCP for NPD and Commercialisation of Ideas, such as those run by the various Teagasc Centres and UCC courses.
- (ii) Develop Best-in-Class Production Efficiency Programmes, particularly for commodity sectors. Dedicated sales, marketing, food safety management and customer relationship management courses, specifically for SMEs should also be introduced; and
- (iii) Prioritise IT skills, in particular those underpinning supply chain management/efficiency and logistics competencies.

Recommendation XVIII

Specialist induction programmes for immigrant workers should be further developed by FÁS, in consultation with Enterprise Ireland and the Food Safety Authority of Ireland, and delivered in various languages.

Recommendation XIX

The existing FÁS model for in-company training and accreditation, approved by regulatory bodies and industry, and currently operating in the industrial meat sectors, should be rolled out to other food sub sectors.

Recommendation XX

National Centres of Training Excellence should be developed for meat, dairy, consumer foods and biotechnology, building on current funding supports and the existing training and research centres, such as Moorepark (dairy research and training); the National Food Centre (meat/consumer foods research and training) and the UCC Food Training Unit and Food Science & Technology Faculty (food biotech research and training).

These Centres should work with Enterprise Ireland in the area of commercialisation of the results of the research.

STATE SUPPORT/TRAINING INFRASTRUCTURE

Recommendation XXI

The roles of the state agencies involved in training and company development need to be more clearly defined, in particular those of FÁS and Enterprise Ireland. Following from this, a focused trade communication campaign should be undertaken, to outline the roles of the various state agencies in this area and to explain various training/HRD supports available to companies.

Recommendation XXII

Within the context of the significant drivers-of-change, FÁS executives and Enterprise Ireland's Development Advisors should undergo a focused, specific training programme on identifying skills weaknesses and assessing training needs.

Recommendation XXIII

A national, centralised data source of all accredited education and training information, including both accredited trainers and training programmes, should be established by FÁS and Enterprise Ireland in consultation with Teagasc.

Recommendation XXIV

An induction qualification for the food industry, to cover such areas as employee health and safety in the workplace, food safety, hygiene and basic numeracy should be introduced.

Recommendation XXV

The Department of Enterprise, Trade and Employment should undertake:

- (a) That the Skillnets initiative, which is considered a good example of a practical, company-focused solution to training needs, should be further expanded and promoted.
- (b) Better communication and promotion of the initiative to industry should also be undertaken.

Recommendation XXVI

Formal evaluation and publication of the effectiveness, relevance and quality of in-service training programmes provided, using state grants, should be undertaken by FÁS and Enterprise Ireland, in conjunction with IBEC.

Recommendation XXVII

Enterprise Ireland should review the qualification criteria and application processes involved in its grant aid for HRD with a view to both ensuring their relevance to the sector and streamlining the application process.

2. Overview of the Irish Food Industry – Key Drivers-of-Change and Implications for Food Processors

Overview of the Section

In this section of the report an outline of the relative importance of the various sub-sectors of the food processing industry in terms of their contribution to the Irish economy is presented. In addition, a detailed description of the various ‘drivers-of-change’ which going forward will significantly impact/influence the development of the food processing industry in Ireland, is provided. The drivers-of-change which are considered in this section include:

- consumer trends;
- trade purchasing developments.

2.1 Overview of the Irish Food Industry

Internationally, Ireland is recognised as a strong food-producing nation, with output from the food industry making a substantial contribution to national wealth and employment. However, in common with other developed nations, as the Irish economy advances, its reliance on agriculture and food processing for wealth generation is declining. Nevertheless the agri-food industry (which includes agriculture, food, drinks and tobacco) accounted for 9.7% of total employment and 9.2% to GDP in 2001.

Table 2.1: Gross output in the Food, Drink and Tobacco Industry: 1999-2000

	Food	Food	Food	Food	Total	Drinks & Tobacco		Overall
	Meat	Dairy	Grain	Other	Food	Drinks	Tobacco	FDT
1999 €m	3,540	2,818	796	5,155	12,309	1,677	248	14,234
% FDT	24.7%	19.8%	5.6%	36.2%	86.5%	11.8%	1.7%	100.0%
2000 €m*	3,869	2,919	768	5,720	13,276	1,747	307	15,330
% FDT	25.2%	19.0%	5.0%	37.3%	86.8%	11.4%	2.0%	100.0%

* Estimate based on 2000 Early Estimates of Turnover.

Source: CSO, 1999 Census of Industrial Production.

According to the 1999 Census of Industrial Production, gross output of the Irish food industry (including food drink and tobacco) amounted to Euro 15.3 billion. Exports from this industry amounted to Euro 7 billion or in the region of 8.4% of total exports during 2000 – the latest year for which complete data is available. The food industry, which is based on a major natural resource using almost exclusively domestic raw materials, provides direct employment for some 47,000 people in addition to 280,000 indirect jobs on farms and in sub-supply industries and ancillary services. The Irish food wholesale and retail sector is also a major contributor to economic activity. It provides direct employment for over 200,000 people with turnover at retail level exceeding Euro 6 billion.

Whilst the Irish food processing industry consists of a number of distinct sub-sectors, the meat and dairy sub-sectors represent its most significant components. Combined, these sectors account for close to 45% of the gross output of the food processing industry and some 55% of total employment. Each of the sub-sectors are individually profiled in Section 3 of this report.

Table 2.2: Employment in the Food, Drink and Tobacco Industry: 1999-2001

	Food	Food	Food	Food	Food	Food	Drink & Tobacco		Overall
	Meat	Dairy	Grain	Bread	Sugar	Other	Drinks	Tobacco	FDT
1999	13,800	7,400	2,000	5,500	3,450	7,650	5,000	950	45,750
2000	13,100	6,800	1,800	5,400	3,300	7,200	5,900	1,000	44,500
2001	12,900	9,300	1,800	5,200	3,300	7,600	6,000	900	47,000

Source: CSO, *Industrial Employment, Average of 4 quarters (1999,2000) 3 quarters (2001)*.

As indicated in Table 2.2, over the 1999-2001 period, the total number employed in the FDT industry increased by 2.7%. Of the 47,000 employed in the FDT industry in 2001, some 40,100 or 85% were employed in the food processing industry.

In addition, the 1999 Census of Industrial Production records that the Irish food industry comprises approximately 700 enterprises (with 806 local units) of which 95% are categorised as medium (50 to 250 employees), small (10 to 49 employees) or micro enterprises (less than 10 employees).

Table 2.3: Food and Overall Industry Structure by Numbers Employed: 1999

Numbers employed	Local Units (nos)		Employees (nos)		Average Employment per unit (nos)	
	FDT	Industry	FDT	Industry	FDT	Industry
Under 10	220	1,658	1,220	9,327	6	6
10-19	155	1,055	2,169	14,452	14	14
20-99	292	1,672	12,475	70,692	43	42
100-249	106	391	16,610	59,510	157	152
250+	33	180	15,039	100,373	456	558
Non-attributable	-	69	-	11,859	-	172
Total	806	5,025	47,513	266,123	59	53

Source: CSO, *Census of Industrial Production, 1999*.

Given the relatively small size of the domestic Irish market when compared to the quantity of food processed in Ireland, the food processing industry is heavily export dependent. While the extent of this varies by sub-sector, it is particularly the case for the meat and dairy sectors, with over 90 percent of beef and over 80 per cent of manufactured dairy products being exported. The UK represents the single most important market for Irish food exports – accounting for more than a third of all food exports in any given year.

Overall the EU, including the UK, accounts for some 65% of total Irish agri-food food exports, with a variety of Third Country markets accounting for the balance. Meat represents our single most important food export category, accounting for in the region of 25% of all FDT trade, with dairy exports the next largest category representing close to 20% of total trade.

Table 2.4: Exports of selected agri-food items, including export refund: 2000

€m	UK*	Other	Non EU	Export EU ^o	Non EU [§]	Total [§]	%	%	%	%
							Non EU	UK	Other EU	Total
Beef	346.2	445.3	274.0	306.7	580.7	1,372.2	42.3%	25.2%	32.5%	18.3%
Sheep	11.6	155.5	-	-	-	167.1	-	6.9%	93.1%	2.2%
Pigmeat	163.1	63.1	52.2	5.6	57.8	284.0	20.4%	57.4%	22.2%	3.8%
Poultry & Eggs	49.6	69.4	7.5	-	7.5	126.4	5.9%	39.2%	54.9%	1.7%
Dairy Products	390.6	629.5	327.8	97.4	425.2	1,445.3	29.4%	27.0%	43.6%	19.3%
Fruit & Veg	156.3	14.1	2.3	-	2.3	172.7	1.3%	90.5%	8.2%	2.3%
Arable Crops	241.0	19.6	30.5	2.1	32.6	293.2	11.1%	82.2%	6.7%	3.9%
Sugar	58.9	28.0	14.0	1.3	15.3	102.2	15.0%	57.6%	27.4%	1.4%
Other Food	929.5	561.8	1,000.0	-	1,000.0	2,491.3	40.1%	37.3%	22.6%	33.4%
Drink	287.7	252.4	312.2	-	312.2	852.3	36.6%	33.8%	29.6%	11.4%
Tobacco	46.3	44.2	13.4	-	13.4	103.9	12.9%	44.6%	42.5%	1.4%
Processed Products**	-	-	-	70.1	70.1	70.1	100.0%	-	-	0.9%
Total Agri-Food	2,680.4	2,282.9	2,033.9	483.2	2,517.1	7,480.4	33.6%	35.8%	30.5%	100.0%

Source: CSO Trade Statistics, DAFRD data on Export Refunds.

* UK = Great Britain & Northern Ireland.

** Not possible to readily attribute export refunds for processed products to individual product categories.

^o Excluding Export Refunds.

[§] Including Export Refunds.

In general terms across the food industry, the most significant marketing challenge over the medium term will be to increase the proportion of Ireland's total food output being exported to higher value EU markets and to correspondingly lower the proportion of output being traded on international (Third Country, i.e. countries outside of the EU) commodity markets.

In the case of the beef sector, some 45% of Irish beef was exported to Third Country markets in 2000 with the balance being sold on EU markets. The UK was, by far, the most important market. Over the period to 2007, Bord Bia's marketing strategy targets that some 70% of output will be exported to EU markets. Meeting such a demanding target in the challenging meat marketing environment will require a considerable shift in focus by the beef industry.

In the dairy sector, currently there is a significant reliance on subsidised Third Country export markets. During 2000, these markets accounted for almost a third of the total Irish dairy product exports. Given the nature of Irish dairy product output, in the short to medium term it is unlikely that the dairy processing industry will be positioned to substantially reduce its dependence on these markets – although this industry feature will be significantly influenced by future agricultural and trade policy agreements (notably CAP and WTO reforms). Over time, however, it is likely that, as the industry strives to move up the value chain, a concerted effort will be made to focus on the more consumer-driven internal EU market. In this context the UK, Germany and France are likely to feature strongly as targets for an increasing share of dairy trade from Ireland. This is based on further developing our current market positions as, according to 2001 CSO export statistics, the UK and Germany are already Ireland's most significant EU markets for dairy products.

In Prepared Consumer Foods, the Prepared Consumer Foods Group has set itself the target of growing total output from €2.3 billion in 2000 to €3.1 billion by 2004 – an overall increase of 36%. In line with this, the target is to increase exports to 54% of output by 2004, compared to 50% in 2000. The UK accounted for three-quarters of total exports in 2000 and will remain the dominant market to 2004.

2.2 Overview – Drivers-of-Change 2002-2007

In the past, the Irish food processing industry has operated in a highly protected environment, insulated from the vagaries of international markets by a support framework which was primarily based on socio-political rather than on economic considerations. However, the landscape in which this sector operates is changing. The protection enjoyed under the Common Agricultural Policy (CAP) is gradually being eroded and is likely to be replaced by a support system that will be de-coupled from output and focused on environmentally acceptable production.

Parallel with this reduction in market protection, a significant increase in competition for available funds in the agri-food sector will occur as the EU gears up for enlargement. Some of the accession countries, as well as offering market opportunities, have potential to become substantial food exporting nations in the medium-term – particularly Poland, Hungary and the Czech Republic. This will intensify the competitive environment in a world where growth in food output is expected to outpace population growth (in the developed world).

In addition, under the influence of the World Trade Organisation (WTO) market liberalisation is gaining pace, reducing trade distorting subsidies and increasing competition. Whilst world free trade in agricultural products may be some time off, globalisation of the market for food products is set to continue. It is encouraged by GATT/WTO policies, by new technologies that make the long-distance transport of food products economically feasible and by the convergence of demand patterns among consumers world-wide.

Dramatic changes are also occurring upstream and downstream of food manufacturing as agricultural policies are reformed in such a way as to become more market oriented, and as food retailing becomes more concentrated, more efficient, more international, and consequently, more powerful.

Finally, consumer demand is evolving away from “commodity” products towards more differentiated, high quality, value-added products. To remain competitive in the modern world, manufacturers must necessarily develop a capacity to innovate quickly and effectively. Most firms cannot rely on producing a constant range of traditional foods. This will require strategic investment in basic and applied R&D in the food sector going forward.

While there are many convergent trends in the food industry in consumption behaviour, retailing and manufacturing, there still remain substantial differences between countries and between sectors and it will be some time before a homogeneous geographic pattern emerges. Nevertheless, some common driving forces exist throughout Europe, not least the rise of the multiple-retailer, particularly in Northern Europe, which has tended to neutralise the power of the (manufacturer’s) brand.

Large multinational manufacturers have made a number of strategic responses to these developments. First, they have seized opportunities to develop European as opposed to national brands and simultaneously have increased their power relative to the retailers who, to date, have remained predominantly nationally based (though these are also internationalising slowly). Second, manufacturers are attempting to develop plants that are flexible enough to supply the wide product range demanded by fragmenting consumer markets. Third, they are reorganising production into large plants capable of supplying the entire European market in certain product categories. Finally, they are seeking new products based on new technologies. In summary, large firms are adopting a mixture of cost minimisation and product differentiation strategies to meet the changing market environment.

Smaller manufacturers, whose markets are either national or local, must also respond to change. They must either merge, develop products and strategies to supply European-wide niches or develop strategies that at least defend their home markets against foreign competitors.

Against this background, consolidation in the retail (and food service) sector has resulted in a concentration in the balance of power within a relatively small number of large groups. Driven by changing and more sophisticated consumer preferences, food buyers are placing increased emphasis on product safety and traceability. Especially in developed markets, retailers are also responding to segmentation in consumer demand with some distinct customer groups emerging, e.g. the rapid growth in demand for natural or “organic” foods and the emergence of functional or “designer” foods.

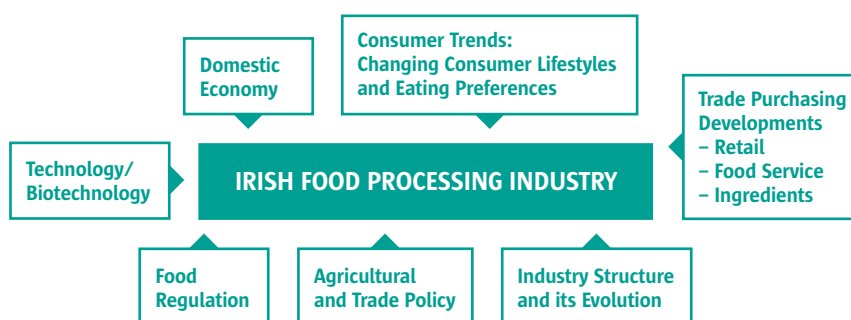
At the same time, research in the area of biotechnology and the development of genetically modified plants and animals open up possibilities for new food products and services, whilst advances in communication technology, and particularly the growth in internet shopping, is providing new market channels. A recent Bord Bia report, *Developments in Food Markets*, June 2000, indicated that e-tailing could account for up to 30 percent of UK retail sales by 2020.

It is likely that the combined influence of all of these developments will result in a profound change in the future landscape within which the Irish food industry will operate. However, such pressures may also provide the catalyst that will result in the development of innovative products, technologies and services, moving Ireland forward from the producer mind-set which has historically prevailed.

The next part of this section presents a detailed examination of the key driving forces likely to impact on the Irish food industry over the coming five years and discusses the implications of each of these drivers for the Irish food manufacturing sector.

Diagram 2.1 provides a summary overview of the key drivers-of-change being examined in this section. They are grouped under seven major themes.

Diagram 2.1: Overview of Key Drivers-of-Change



2.3 KEY DRIVER (I): CONSUMER TRENDS

During the past decade consumer choice and expectations have grown at a rapid rate. A number of consumer trends have combined to influence this and have had a direct and dramatic effect in the food industry as a result. Some of the most important of these trends affecting the food industry are briefly outlined here.

Busier

Today's consumer has, on average, a **busier lifestyle** than was the case in previous decades. The number of hours spent at work has been increasing, as have commuting times. In addition, female participation rates in the labour force have been rising steadily. In Ireland, according to the latest CSO Quarterly National Household survey (Q3, 2002), female participation rates reached 50.2% in Q3 2002. This compares to 44.0% in mid 1998. With consumers preferring to devote a greater proportion of their disposable time to leisure and recreation, time dedicated to preparing and cooking food has been significantly reduced. There has been a corresponding increase in demand for "convenience" products and for ready-to-heat and ready-to-eat products.

Wealthier

Incomes, as measured by GNP, have broadly been rising over the past two decades, throughout the EU and US in particular. Both unemployment and interest rates have generally been declining throughout the 1990s. The combined effects of these developments have been a **substantial increase in disposable incomes**. This means that consumers have the ability to spend more on higher value, added-value foods, even though the actual percentage spent on food from the total household budget has fallen over the past 30 years. This reflects the fact that people do not consume more and more food as their income rises, but rather tend to purchase higher value foods as opposed to greater quantities of food.

Table 2.5: Family Expenditure Survey, 1968 and 1998-99

	1968	1998-99
Food	26%	17%
Housing	13%	16%
Motor/Travel	13%	17%
Leisure	8%	17%

Source: CSO, Dublin.

Value-for-Money

Despite increasing wealth, consumers are increasingly focused on seeking out better value. Increasing **price consciousness** is reflected in the growth of discount retailing across Europe, the development of value lines and ongoing price promotions by mainstream retailers. The introduction of the Euro has heightened price comparisons across the EU.

More Widely Travelled

The explosion in tourism since the 1960s, and the increasing range of international destinations being visited, has meant that consumers are far more exposed to new tastes and eating habits. Higher levels of immigration have also impacted on "local" food offerings. The increasing proliferation of media has also increased consumers' awareness of the diversity of international food possibilities.

Ageing

The "**greying**" of the population, due to declining birth rates and increasing life expectancy, continues in the developed world. Problems with **obesity** as a result of more sedentary lifestyles and changed eating habits are also growing, despite an apparent greater awareness of health matters. These trends have an impact on the type and nature of food on demand and on the packaging, preparation and marketing approach employed.

Table 2.6: Age profile – % Population over Age 50 in selected Countries

	1999	2006 (f)
US	27	30
UK	32	33
Germany	35	37

Source: Datamonitor.

Table 2.7: Obesity – % of Population in selected Countries

	2000	2010 (f)
US	31	47
UK	20	31
Germany	24	34

Source: Datamonitor.

Changing Household Structure

The variety of household types in terms of numbers of people and stage of lifecycle is a significant driver of consumer demand. It is especially noteworthy that the number of one-person households is increasing steadily. This is exemplified by developments in the UK where the number of single person households has doubled since the 1960s. This trend is being replicated all across Europe.

Table 2.8: UK Household Size 1961-98

No. of People per Household	1961	1998
1	14%	29%
2	30%	36%
3	23%	15%
4	18%	14%
5	9%	5%
6+	7%	2%

Source: General Household Survey, 2000.

More Individual

Consumers are becoming **less homogeneous** as a group. Traditional approaches to segmentation along demographic lines are less relevant, with the consumer food market becoming increasingly fragmented in terms of lifestyles and tastes. The availability of time and wealth are probably the two key market influences. Cash rich but time poor consumers are more likely to purchase prepared, convenient products or eat in restaurants while cash poor but time rich people are more likely to purchase basic foodstuffs and spend time in food preparation.

2.4 Consumer Trends – Impact on Buying Patterns

As outlined in section 2.3, consumers, as buyers of food, have changed their eating habits dramatically over the past decade. People are now better able to afford and demand à-la-carte solutions to their nutritional needs. This makes the task of supplying the consumer market all the more difficult, because it is so diverse and demand priorities are constantly changing.

Safety Concerns

One of the most dramatic changes in recent years has been the consumer move from red meat in particular and, to a lesser extent, a trend towards greater consumption of fruit and vegetables. The most recent downward pressure on meat consumption has been driven by BSE in the UK and the Continent, and the outbreak of Foot and Mouth in Spring 2001. The resulting negative publicity has been very damaging to the image of red meat and is the main contributing factor to the ongoing decline in red meat consumption, particularly in the EU. Fruit and vegetable consumption is benefiting from greater consumer awareness of the health benefits of these products.

“Healthy Foods”

Driven primarily by the need to preserve and enhance their health and appearance, consumers are increasingly concerned about the health aspect of food. This has manifested itself in increased demand for:

- low fat and low calorie products
- functional and fortified foods
- probiotics (mainly consumer dairy products with added enzymes/cultures to enhance human health)
- organic products.

“Snacking/Indulgent” Products

In tandem with the trends towards healthier products, there is also a rapid growth in the market for snack/indulgent products. These products are being consumed as rewards and treats, as comfort foods in times of stress, and as fast food.

Table 2.9: Healthy vs. Indulgent Food Products

Segment CAGR* 1995-99 (%)					
UK	Low & Light	5.8	US	Low & Light	4.6
UK	Indulgence	2.8	US	Indulgence	3.8
UK	Other	3.1	US	Other	4.3

* Compound Annual Growth Rate.

Source: Datamonitor.

Time Pressures – Convenience Foods & Eating Out

The reduction in disposable time outside the workplace has led to consumers looking for ways to economise on time and effort in food preparation. A 1999 consumer tracking study (Family Food Panel) by a leading international consumer panel information group, Taylor Nelson Sofres, London, has shown that cooking the main meal of the day took up to two hours in the 1950s, fell to one hour in 1980 and was just 20 minutes by 1999.

Buying prepared food outside of the home is becoming much more prevalent in Europe and accounts for half of all food consumed in the US. There has been an explosion in the “**ready-to-serve**” segment with take-aways, home delivery and retail “home meal replacement” counters all experiencing strong growth. The “**ready-to-cook**” and “**ready-to-heat**” segments are also expanding rapidly.

Table 2.10: Ready Meal Consumption in Selected Countries ('000 tons)

	Frozen Ready Meals and Pizza			Chilled Ready Meals		
	1994	1999	% Growth	1994	1999	% Growth
France	229	248	8%	80	148	85%
Germany	236	262	11%	13	15	15%
Ireland	34	62	82%	16	26	62%
UK	155	228	47%	72	126	75%

Source: Euromonitor.

2.5 Implications of Consumer Trends for the Food Processing Sector

Over the past twenty years, leading food manufacturers have been shifting from a production-led to a market-led approach. This shift in emphasis has greatly increased the importance of the consumer, the market and marketing for suppliers. Accordingly, there are some obvious implications for suppliers as outlined below.

Food Safety and Traceability

It is a prerequisite of business that all food manufacturers meet the minimum legal hygiene and safety standards. As a result of food scares across all product categories, EU authorities have imposed much higher standards of food safety and traceability on food manufacturers. In addition, retail trade customers now require additional levels of quality assurances. These buyer requirements are forcing suppliers to develop and maintain high quality standards. Investing in developing and maintaining leading edge safety and quality standards are now ongoing costs of doing business with leading customers.

New Product Development (NPD)

In a mature, slow-growing food market, product innovation and new product development that better meet emerging consumer requirements offer the most obvious growth opportunities. Technological developments offer exciting possibilities in this regard. These can be focused on new product development or on new packaging and presentation formats that access new market segments or new market channels.

As well as the obvious need for new product development to access new market opportunities, it is also critical to maintain and enhance relationships with trade customers. Increasingly, retailers in particular are pushing the product development role back on suppliers. Strong NPD capabilities are thus essential for positive long-term retail trade relationships.

Market Research

The importance of market research, at both the level of the consumer and (trade) customer, is obvious. The need to continually monitor and track evolving consumer attitudes and requirements is paramount in a market-led approach to food marketing. Changing demographics, modern lifestyles, emerging niches and new routes to market are all contributing to changes in the overall market. A full understanding of these forces is essential in order to successfully market both new and traditional food products.

Suppliers also need to be fully informed of overall market developments. The strategies of both customers and competitors, particularly in terms of mergers and acquisitions, need to be closely monitored. Ongoing tracking of product developments, in terms of new packaging and new product innovations, is equally significant.

Marketing

Building on their research findings and knowledge of market dynamics, branded food suppliers will need to continually review their product positioning and brand strategies in the context of intensifying competition, the impact of category management and retailers' development of competitive Private Label offerings. Equally, Private Label manufacturers must have an in-depth understanding of consumer needs and the ability to correctly price and position their product. Changing lifestyles and increasing disposable incomes are driving this renewed emphasis on consumer marketing.

2.6 KEY DRIVER (II): TRADE PURCHASING DEVELOPMENTS

Developments among key trade buyers are a significant driving force for change in the food manufacturing sector. These developments will be examined in the three main market channels, namely, retailing, food service and food ingredients.

Retail

The retail sector has been evolving rapidly, with the pace of change accelerating over the last five years. Some of the most significant factors driving change are examined below.

Retail **concentration** has been increasing dramatically across the EU as retailers strive to build scale. This obviously increases both their buying and marketing power and has had the long-term effect of reducing the power of the manufacturer's brand.

Table 2.11: Selected EU Retail Concentration, 2000

	Market Share of Top Five Retailers (%)
UK	70
Germany	70
Sweden	95
France	70
Holland	95

Source: Nielsen.

In addition to a policy of concentration in their home markets, retailers are also **internationalising** at a rapid pace. Wal-mart (USA), the world's largest retailer, is well on the way to being a truly global company, while Ahold (Holland), Auchan (France) and Tesco (UK) also have significant international operations. In tandem with this, the emergence of international buying groups across the EU has also strengthened the buying power of retailers for grocery and household products.

Retailers are also expanding their businesses by increasing their **Private Label** offer. This provides them with both operating margin and differentiation opportunities. In this respect, UK retailers lead the way with Continental EU retailers aggressively playing catch-up.

Table 2.12: Private Label Penetration (%) in Selected Countries

	1999	2001
Great Britain	36	35
Germany	23	26
France	22	24
Spain	13	17

Source: Key Facts for European Decisionmakers, EuroPanel, 2002.

There is also a clear trend towards **centralisation** of both purchasing and distribution across EU retailing. This development is driven by the need to increase buying power and to gain supply chain efficiencies as competitive pressures increase. The successful development of such centralisation by leading UK retailers has given impetus to its introduction across the EU.

Furthermore, as part of their drive for supply chain efficiency, retailers are **rationalising their supply base**, and moving towards deeper partnership relationships with a smaller number of larger suppliers. This provides both opportunities and threats for suppliers. In line with this, they are also pushing new product development and innovation requirements back on suppliers.

Finally, retailers are taking a more **proactive food safety** and traceability role. Much of the retailer in-house research has shown that their customers place their faith in retailers themselves to provide safe and healthy food. Accordingly, retailers are investing in developing and monitoring product safety and traceability standards.

Food Service

Rising disposable incomes, the availability of affordable meal solutions, and lifestyle changes mean that food service accounts for a **growing share** of consumers' food expenditure. There is a discernable shift from retail to food service in terms of the overall food market.

In the US over half of all food is now consumed outside the home. Food service across Europe is forecast to account for close to half of the total food market by the end of this decade, according to recent Bord Bia forecasts.

This growing trend in food service demand has led to a marked growth in both themed restaurants and ethnic cuisine and has contributed to **globalisation of menus**. Ethnic cuisine is going mainstream and these developments have also caused greater fragmentation in food service product offerings.

Simultaneously, the emergence of global players in quick service restaurants, hotel chains and contract catering have all contributed to **consolidation**. This trend is continuing at national level as food service operators attempt to build scale and attain greater supply chain efficiencies. There is a corresponding noticeable trend towards centralised distribution. Furthermore, supplier rationalisation is becoming a much more immediate issue for the sector.

As food service operators consolidate and build scale, there is also a move to **concentrate on core activities**. This is resulting in food value-added, preparation and convenience requirements being pushed back onto suppliers.

Food Ingredients

The food manufacturing sector is increasingly shifting from food manufacture to food assembly. This is facilitated by **strategic outsourcing** agreements with ingredient suppliers. Such agreements allow manufacturers to concentrate on business development and branding/marketing activities while allowing them to take advantage of the capital investment and technical know-how of the ingredient suppliers. Thus the ingredient suppliers supply tailored, value-added components for assembly into final products.

Major food companies are consolidating and streamlining operations in an effort to improve efficiencies and margins. This focus on cost competitiveness is resulting in their R&D budgets being slashed, with specialist ingredient companies fulfilling the critical R&D requirement. Arising from this R&D need, and combined with general business competitiveness pressures, food companies are developing deeper relationships with fewer preferred suppliers. This is in turn leading to **consolidation at ingredient supplier level**.

One consequence is that ingredient suppliers are increasing their technical **R&D** capabilities and their ability to develop tailored, value-added ingredient solutions for food manufacturers. Thus product innovation and new product development will increasingly become the responsibility of the ingredient suppliers.

In tandem with these developments, there is also a clear move towards the **global sourcing** of ingredients as food manufacturers seek to maximise cost and quality efficiencies. This is putting extreme price pressure on local ingredient suppliers. Such price pressures are likely to increase further in the medium term, especially for commodity ingredients.

Finally, arising from developments in the food market overall, ingredient companies must increasingly develop and maintain higher product safety, traceability and quality assurance standards.

2.7 Implications of Purchasing Trends for the Food Processing Sector

Across all routes-to-market, but particularly the retail and ingredients channels, **scale** is becoming an increasingly important issue. Suppliers need to carefully consider their growth strategies in this regard. Experience in the food sector to date suggests that the majority of companies will follow a merger and acquisition path to growth, with organic growth being supplementary. Joint ventures and greenfield investments are much less common in the food sector.

Given the increasing consolidation of the international food industry, and the consequent decrease in the number of potential trade customers, suppliers need to develop **new types of supplier-buyer relationships** in order to protect and grow their businesses. This will include the trend towards more open partnership relationships and will also centre on the suppliers ability to provide solutions to buyers across a range of disciplines including supply chain management, new product and packaging development and innovation, and exciting trade and consumer marketing and promotion. This is in stark contrast to the adversarial type relationships that existed previously.

Accordingly, suppliers need to invest in understanding **customers' strategies** and in understanding their customers' customers. Such insights are necessary to effectively develop new product propositions and tailor solutions for the particular customer in question. Each of the three routes to market – retail, food service, and ingredients – have very specific and distinct market, product and segment knowledge requirements.

The increasing competitiveness of the food marketing environment is resulting in a greater drive for **supply chain efficiencies**. This is presenting threats in the retail and ingredient sectors as major buyers are rationalising their supply base. This trend is also noticeable among the larger food service operators, though the highly fragmented nature of the food service market also offers opportunities for smaller companies.

Across all market channels, there is a rapidly growing need for **innovation** and new product development. This is arising because of the changing nature of buyer-supplier relationships and the R&D requirements being increasingly pushed back the value chain to manufacturers and ingredient suppliers.

Marketing has assumed a much more important role for all food manufacturing and ingredient companies. This reflects the move from a 'production focus' to a more 'customer and market-led approach'. It is due to the need both to better understand customers and to position products more effectively in relation to customer needs.

As has been clearly identified in all three main routes to market, enhanced **food safety and traceability** is a critical business prerequisite.

2.8 KEY DRIVER (III): INDUSTRY STRUCTURE

The structure of the food manufacturing industry has changed radically over the past decade, reflecting the impact of competitive forces on the sector. If anything, the pressure for change will increase over the medium term as global competition intensifies. Some of the main driving forces are outlined below.

In terms of the Irish primary processing sector, **over-capacity** is a critical issue. This is especially so in the key beef and dairy sectors. In economic terms, there is significant waste created by this over-capacity and it facilitates a larger number of smaller players. Many smaller companies find it difficult to meet the demands of increasingly sophisticated retailers. This situation also limits the industry's ability to build sustainable market scale in international markets as smaller companies lack the turnover and profitability to fund significant R&D and marketing programmes. It also results in a lack of investment in both new facilities and human resources and, overall, in a lack of scale which hinders competitiveness.

Within the global food industry, there is substantial **consolidation**. This is driven by increasing pressure to **achieve scale** which, in turn, is driven by both customer and competitiveness needs. Retailer concentration and internationalisation, the emergence of European-wide buying groups, and cross-border food service operations are all increasing the scale and buying power of customers. Competitive pressures are also intensifying as a result of buyers' **supply-chain efficiency** initiatives. Food manufacturers are reacting to these twin forces by building scale of their own to cope with the demands of these global and international customers.

Specifically in the case of Irish food manufacturers, the issues of **production seasonality** and **market peripherality** have direct implications for the business and product mix undertaken by Irish suppliers. Both the dairy and beef businesses are directly impacted in this regard. This poses specific challenges in moving up the value chain towards consumer-ready products.

Finally, **e-commerce** initiatives – both B2B and B2C – are likely to grow in importance over the medium term. In the case of commodity products, this development is likely to further increase price pressures.

2.9 Implications of Industry Structure for the Food Processing Sector

As highlighted previously, **scale** is an increasingly important issue. In the food industry, acquisitions are usually viewed as the primary means of achieving such scale. Given this consolidation and rationalisation process, smaller, domestically-focused companies will be under increasing pressure. Industry rationalisation is most likely to occur with both take-over by larger players and closures as a result of market forces contributing to the rationalisation process.

Increased emphasis must be placed on **improving supply-chain efficiency**. This is driven primarily by trade buyers and their ongoing need to improve competitiveness. Such initiatives have direct implications for both the numbers of suppliers likely to survive in the long term, the number of links in the supply chain and the nature of the buyer-supplier relationship.

Arising from these developments, suppliers need to tighten links with **key customers**. This will involve investment in understanding their customers' strategies and in positioning their products and services accordingly. It is also essential in terms of being able to put forward new product innovations that suit their customers' requirements.

This R&D and new **product development** function is now central to both suppliers' growth ambitions and to their relationships with key customers. It has arisen as their trade customers have pushed R&D back the value chain to concentrate on their core activities of business development and marketing. Accordingly, it provides suppliers with an opportunity to develop deeper and tighter relationships with key accounts.

Based on these requirements – understanding customer strategies and increasing R&D effectively – and noting the ongoing industry consolidation, it is imperative for food suppliers to invest in monitoring and **analysing industry developments**. Given the speed of movement of competitors and the fast-moving nature of the food industry, such information is vital to framing appropriate strategies.

2.10 KEY DRIVER (IV): AGRICULTURAL AND TRADE POLICY

The recent Council of Agricultural Ministers deliberations (October 2002) on the **Common Agricultural Policy (CAP)** concluded that the CAP will be generally maintained in its current form, at least until 2006. Proposed reforms are postponed until that date although, from 2007, the CAP budget will be limited to an annual increase of 1% per annum.

The implications of this for Irish agriculture are clear. In the period to 2006, the existing budget for market support and direct payments will be protected and will not be reduced by proposals in the mid-term review. However, the existing budget will have to cover any new reforms introduced from now to 2006.

Secondly, the mid-term review discussion on modulation will go ahead. In essence, these modulation proposals seek to reduce direct payments by 3% per annum for seven years, with the funding recouped being used for rural development measures. This is set for discussion in 2003. In any event, any agreed changes will not be implemented until after 2006.

Furthermore, discussions on de-coupling will also take place in the mid-term review in 2003.

De-coupling essentially means the payment of direct payments to producers without the need to produce the associated crops or livestock. There is no clarity at this stage on whether these proposals will be agreed or not, but it does seem likely that nothing radical will be implemented before 2007.

Over the longer term, i.e. 2007-2013, the decision to limit direct payments at their 2006 level with a 1% per annum inflator is a key issue. Given EU enlargement, this will obviously put huge pressure on the budget. It should be noted, however, that there will be no limit on rural development spending.

With the milk quota regime now fixed until 2007, and livestock numbers likely to be stable under the current CAP arrangement, the medium term outlook is for reasonable stability in primary dairy and meat production.

EU enlargement also represents a policy decision that will impact directly on the food manufacturing sector. It will provide opportunities in terms of an increased market, and threats in the form of increased competition. In January 2004, the following countries will join the EU: Poland, Hungary, Czech Republic, Slovenia, Estonia and Cyprus.

Under the Doha Declaration in 2001, **World Trade Organisation (WTO)** members have committed themselves to comprehensive negotiations in the agriculture sector aimed at:

- market access: substantial reductions
- export subsidies: reductions of, with a view to phasing out, all forms of these
- domestic supports: substantial reductions for supports that distort trade

The WTO deadline for agreement is 1 January 2005. The policy direction is clear. By 2005, the agriculture sector is likely to be further liberalised and, from an Irish perspective, this means increased EU market access for Third Country suppliers and lower levels of export refunds on the principal agricultural commodities. Competitive pressures will intensify greatly in this scenario.

2.11 Implications of Policy for the Food Processing Sector

The impact of CAP reform over the coming 3-5 years is likely to be minimal. Livestock numbers and milk quota will be broadly maintained to 2007, thereby ensuring stability in raw material supply to the primary processing sectors. The longer-term outlook is more uncertain, as the twin impacts of the agreed budget limitations from 2007 and the consequences of EU enlargement begin to impact.

The next WTO agreement on agriculture will not be finalised until 1 January 2005. While the details are obviously not yet agreed, the policy direction towards liberalisation and greater competition is clear. This will almost certainly result in greater import competition in EU markets and lower supports for exports outside the EU. This will in turn impact significantly on the dairy and beef sectors.

EU enlargement is scheduled for 2004. It is likely that the impact on the food market will be broadly neutral in the first few years post-accession as the new member countries adapt to EU market requirements and conditions. As they undertake the necessary investment to meet trade and consumer requirements, they will, over the long-term, turn their attention to the European market. On account of their lower cost base, they represent a significant competitive threat to the lower value-added primary processing segments of the Irish industry.

2.12 KEY DRIVER (V): FOOD REGULATION

As a result of a series of food scares throughout the 1990s, the importance attached to food industry regulation has increased dramatically in recent years. Much tighter standards have been imposed and enforcement is more rigorous. In line with this, food processors and manufacturers have had to increase the resources devoted to this aspect of their business.

The whole issue of food **safety** is now important to consumers and, accordingly, to trade buyers. Furthermore, food scares such as BSE, Foot and Mouth, questionable ingredients in animal feeds, pesticide residues in crops and have resulted in the EU imposing higher regulatory standards to protect the safety of food. Some of the initiatives implemented include:

- European Food Safety Authority created at EU level and the establishment of Food Safety Authorities at national level. In Ireland, the FSAI was established on 1 January 1999
- Clear delegation of authority to Member States to ensure the surveillance and control of food operators
- Introduction of more comprehensive EU legislation on food claims, e.g. nutritional claims, health claims, etc.
- Review of the adequacy of EU labelling legislation to better inform consumers about food products.

As part of the move towards better food safety, there is a corresponding trend towards greater product **traceability**. Such traceability systems need to be independently verified and internationally accredited to be meaningful in international trade terms. The development and implementation of such systems represents a considerable investment for food suppliers.

In line with both of the above developments, there is an international trend towards greater product **quality assurance**. In general, these quality assurance requirements are driven more by trade (retailer) buying requirements than by legislation itself, but such schemes are obviously based on existing regulations and need to be flexible enough to take new regulations into account. The requirements for quality assurance have impacted on both the primary producers and processors and, increasingly, processors will be required to work more closely with the farming sector to relay buyers' requirements.

A particular aspect of food regulation that is changing rapidly is the area of food **labelling**. This is placing substantial demands on processors in terms of separating product and processes, and in ensuring product traceability throughout the supply-chain. Its aim is to facilitate more complete consumer information to allow better-informed decision and choice. However, particularly in the meats sector, it does create specific marketing challenges around the issue of country-of-origin labelling.

Environmental regulation has also emerged as a significant issue for food processors, especially with regard to the disposal of waste by-products. In tandem with regulation aimed at greater food safety, it has resulted in major challenges for some segments of the food industry, such as the beef sector. The need for better facilities to deal with waste and by-products is now a major challenge for both the food industry and the government.

2.13 Implications of Regulation for the Food Processing Sector

In line with its direct link to human health and noting rising consumer concerns, it seems clear that the food industry will be subjected to ever higher standards of food safety. Much of the new regulation will be driven at EU level, with national governments charged with implementation. Some further regulation may arise as a result of future food scares.

Consequently, food processors will have to invest significant time and resources in understanding regulation and implementing systems to meet new regulatory requirements. In particular, this will mean investing in skilled people in their Quality Control/Assurance departments and up-skilling existing staff to meet new requirements.

In tandem with more demanding food safety standards, there are also increased labelling requirements. This has implications for product and process in terms of raw material separation and traceability. In addition, specifically in the case of the meat sector, the requirement for country-of-origin labelling creates serious marketing challenges, especially in EU markets like France and Germany where there is a strong preference for domestic product.

In line with tightening environmental regulation, the food industry is investing heavily in emission and pollution controls. Furthermore, issues surrounding the disposal of waste and animal by-products have posed serious challenges to the food industry. Specifically in the meat sector, pressure on rendering capacity has been very significant following the imposition of BSE-related controls.

The overall trend towards more industry regulation has also increased the industry's cost structure, with both the administration of these regulations and the investments required to meet and maintain standards pushing costs upwards. While such regulation obviously applies industry-wide, there are challenges around meeting these standards competitively and maintaining cost competitiveness. This certainly causes proportionately greater problems for smaller operators.

The industry must also meet the challenge of imposing a much stronger food safety culture among its employees. This requires commitment and time investment from senior management. The risks associated with failing to meet and maintain standards nowadays are too great, due to direct loss of business, intense competition and the longer-term loss of customer and consumer trust.

2.14 KEY DRIVER (VI): TECHNOLOGY/BIOTECHNOLOGY

As with all industries, technology is a major driver of change. This refers to both process automation and information and communication technologies. Specifically in the food sector, biotechnology is also of importance.

In general terms, the trend of **process automation** replacing manual labour is also occurring in the food sector. This is driving productivity gains and lowering unit costs. It is also greatly improving the working environment and conditions for production operatives in particular.

Biotechnology is increasingly a major influence in the food industry. “Traditional” biotechnology has always been a significant element of the food industry. This includes the use of enzymes such as in cheese-making, fermentation in brewing, yeast in baking, etc. However, biotechnology is now moving in the direction of functional/fortified foods. Common examples here include breads with added vitamins, and liquid milk and yogurts fortified with added minerals, vitamins and probiotics.

Many people think of biotechnology in the context of **Genetically-Modified (GM)** foods. These have been the subject of considerable adverse publicity in recent years and it is fair to say that there is considerable negative consumer sentiment and distrust of GM foods. From a scientific viewpoint, next generation GM foods will focus on consumer, as opposed to producer, benefits. In the long run, this may result in greater consumer acceptance of such products, provided that the benefits are communicated properly and possible risks eliminated. However, in the context of this study, it seems unlikely that GM foods will become major elements of the consumer foods market by 2007.

R&D and process technology are also driving the development of a broader range of **functional foods**, as a response to changing and emerging consumer requirements. This includes both fortification and added supplements. The dairy sector, via its range of spreads, yoghurts and dairy-based health drinks, is leading the field in this regard. This trend seems set to continue as consumer lifestyle requirements evolve and health consciousness increases further.

Information Technology (IT) is also a compelling factor for change. It has had a dramatic impact on the food business over the past decade with some examples being the introduction of Electronic Data Interchange (EDI) between suppliers and buyers and computerised process control systems. IT is also the basis for effective category management and for consumer loyalty schemes.

In recent years, the most topical development has centred on Business-to-Business (B2B) and Business-to-Consumer (B2C) **e-commerce** (e-tailing) possibilities. While the hype surrounding internet business opportunities has diminished, the B2C route to market will remain important over time, as consumer participation in on-line shopping increases. These developments are being led by existing retail operators, based on existing sourcing systems and suppliers. In the main, they are servicing their customers via in-store picking of orders.

2.15 Implications of Technology for the Food Processing Sector

Over time, capital investment in new **plant and process automation** will result in less manual and unskilled labour being required in food manufacturing companies. The clear implication is that total employment in those companies will decline over time. There are several other direct implications. Firstly, companies must be capable of making the capital investments required to implement new technology. Secondly, a huge amount of management time is required in order to understand and decide on the technology options most appropriate to their business. Thirdly, both management and workers must be trained to understand and work any new systems implemented.

It also has implications for the **types of operatives** that will be required in the future. They will need to be skilled in managing production lines rather than in carrying out the work themselves. These skills will centre on managing production lines and equipment, and planning process and product flow. Equally, they will be directly responsible for product quality. Acceptance of such responsibility will require a major change in industry culture.

Given evolving consumer requirements and improving technical capabilities, the trend towards more **functional and fortified foods** seems set to continue. One implication of this is that this product range will both widen and deepen. Cereal bars, confectionery and hand-held snacks are all likely to be targeted for such development. Over time, the prospects for functional or fortified-type prospects will be assessed in all product segments.

In line with this, technical **R&D skills** will become hugely important, as will the ability to successfully commercialise new products.

Food manufacturers will also need to build their **e-commerce** capability. In particular, consumer internet shopping behaviour needs to be more fully understood. Both retailers and manufacturers need to better understand how consumers make purchasing decisions on the internet. Arising from this, marketing strategies will need to be adapted to consumer behaviour in this new medium. At first glance, the scope for impulse purchasing would seem to be reduced. In addition, based on a Bord Bia study in 2000 on e-tailing¹, the new emerging standard for product description (“i-labels”) will have to be incorporated. From the manufacturer’s perspective, another benefit of this new market channel is that it provides increased scope for cooperation and collaboration between suppliers and their retail customers. This provides them with a valuable opportunity to tighten and deepen their relationships with key customers.

2.16 KEY DRIVER (VII): DOMESTIC ECONOMY

Developments in the domestic economy are an obvious driver-of-change in the food industry. In addition, given the huge degree of export orientation in the sector, **exchange rates**, particularly €/Stg and €/\$, are an equally important factor and have a major bearing on its underlying competitiveness.

According to the ESRI, the appreciation of the Euro and continuing high growth in the domestic cost structure will combine to erode competitiveness over the coming year. Better prospects for Irish growth in 2003 are therefore dependent on a robust recovery in world trade volumes as major economies return to strong growth rates. This remains uncertain in the short-term. This uncertainty about an international recovery, as reflected in the sharp fall in world equity markets, presents considerable risks to these forecasts.

Table 2.13: ESRI Forecasts for the Irish Economy, 2002

	Autumn 2002 Economic Commentary	Autumn 2002 Economic Commentary	Medium-Term Review 2001-2007
	2002	2003	2007
Real GNP	2.5%	4.2%	4.3%
Inflation	4.7%	4.0%	3.3%
Unemployment	4.5%	4.8%	5.5%

Source: ESRI 2002.

There is little doubt that the economic climate has deteriorated throughout 2002. This must also be seen in the context of a worsening short-term international economic outlook. Specifically in the case of the Irish food industry, it is the impact of macro-economic developments on exchange rates that is of major concern. If, as now seems likely, the dollar is over-valued, then any falls in its value will also bring Sterling down with it. Declines in the value of Sterling have direct negative implications for the competitiveness of the Irish food sector. Similarly, declines in the dollar affect our international competitiveness, which is especially relevant for the beef and dairy sectors.

¹ *Developments in Food Markets*, Bord Bia, June 2000.

The prospects of rising domestic costs (labour, insurance, energy) and deteriorating exchange rates is a particularly bleak one for a highly export oriented industry like the Irish food industry.

An additional factor to be considered over the medium term is the **UK position on Euro participation**. As the single largest export market for Irish food, the UK decision on the Euro is of critical importance to Ireland. Should the UK decide to join, the rate at which Sterling is fixed against the Euro will have a major impact on the competitive position of Irish suppliers to that market.

Labour availability and **wage rate inflation** are equally important key factors for the food industry. While the pressures associated with the boom in the economy in the late 1990s have abated, overall labour availability is likely to remain relatively tight, certainly by historical standards. Latest ESRI forecasts predict unemployment of the order of 5.5% over the medium term. This also presents a demanding environment in terms of attracting and retaining employees.

2.17 Implications of Economic Developments for the Food Processing Sector

Historically, the Irish food industry has proved itself adept at dealing with uncertain economic conditions and fluctuations in exchange rates. It is expected that competitive food companies will continue to meet these challenges successfully.

The main training implications of the impact of a deteriorating economic outlook and a rising cost base are clear. Companies, in a bid to maintain competitiveness, may be inclined to cut all discretionary budgets. Training would probably suffer severely in this regard. Investments in training would potentially be limited to that necessary to maintain legal/regulatory food safety standards and meet essential customer requirements.

A relatively tight labour market also has had implications for recruitment, selection and retention of staff. This is a new challenge for the food industry, compounded by the perceived difficulties and relative unattractiveness of the production environments of many of the food industry sectors. If the food industry is to remain competitive, it must be a competitive purchaser of labour in an economy close to full employment. It must therefore offer competitive remuneration rates and fulfilling careers. In addition, more attention must be devoted to human resource development across the industry.

While companies traditionally may have been tempted to cut training investment in uncertain and difficult economic times, the drivers-of-change outlined above mean that companies will have to invest in re-positioning their businesses to deal with these challenges. A significant element of this investment should be in the development of their employees and the underlying skill base in order to meet the challenges ahead, and accordingly, progressive companies will continue to invest in training and skills development.

Table 2.14 following presents a summary of this section by outlining the key drivers-of change and providing an assessment of the impact of these drivers on food sector output, numbers employed, and the training requirements of the industry.

Table 2.14: Summary – Impact of Drivers-of-Change at Food Industry Level

Driver of Change	Parameter Impacted by Driver of Change			
	Output	Nos. Employed	Skill Base & Training	
Policy	CAP – Agenda 2000	M	L	M
	CAP Reform	H	H	M
	WTO	M	M	L
	EU Enlargement	M	M	L
	Other trade/agricultural policy	L	L	L
Regulatory	Food safety	M	M	H
	Product traceability	L	L	H
	Product labelling	N	N	L
	Environmental (inc. regulations related to recycling, waste handling, packaging)	H	M	H
Industry Structure	Processor consolidation/rationalisation	M	H	H
	Drive to achieve scale	M	H	H
	Supplier rationalisation	L	L	L
	Supply chain efficiency	L	M	H
	Strategic partnership/outsourcing	M	L/N	L
Technology	Processing technology	H/M	H/M	H
	Food technology esp. biotechnology	M	L/M	H
	E-commerce	N	L	M
Purchasing Trends	Buyer concentration	M	H	M
	Changing routes to market	L/M	L/M	M
	Centralised distribution	L/M	M	L
	Growth in private label	L	N	L/M
	Category management/ECR	N	L/N	M/H
	E-commerce in category mgt.	N	N	L/M
Consumption Trends	Communications technology	N	L/N	L/M
	Changing consumption patterns	M	M/L	M/H
	Growth in foodservice	L/M	N	M/H
	Demand for convenience	M	L/N	M/H
	Demand for innovation	M	L/N	M/H
Domestic Economy	Changing demographics	L/M	L/N	M/L
	Wage rate inflation	L/M	M	L
	Labour availability	L	L	M
	Input costs – notably energy/insurance	M	M	L/N
	Exchange rates (Euro:Sterling/Dollar)	L/M	L/M	N
Drive for competitiveness	M	M/H	M/H	

Key: H= High Impact, M=Medium Impact, L=Low Impact, N=No Impact.

2.18 Summary

This section outlined the importance of the food sector to the Irish economy, given that it accounted for almost ten percent of employment and nine percent of GDP in 2001.

The core of the chapter focused on the critical drivers-of-change and their potential impact on the Irish food industry. While there is a broad range of such drivers, they can be grouped under a number of common themes. These include:

- changing consumer lifestyles and eating preferences
- trade purchasing developments
- evolution in industry structure
- policy and regulatory factors
- technology and bio-technology developments, and
- developments in the domestic and international economy.

While the effects of such drivers inevitably vary by sub-sector, the direction of change in the food industry is reasonably clear. The food market of the future will be characterised by:

- higher degree of market liberalisation
- greater intensity of competition
- higher levels of food regulation
- more consolidation across all sectors
- market-led rather than producer-driven
- higher levels of technology involved, and
- more demanding and greater levels of fragmentation among consumers.

These forces are more likely to result in a much more demanding competitive environment and consequently, different and higher levels of skills will be required within the sector in order to compete successfully.

3. Profile of Key Sectors within the Irish Food Industry and Assessment of their Training Needs

Overview of the Section

In this section the main sectors that comprise the food industry are profiled, the drivers-of-change of most relevance to each sector, are indicated and their implications, at a high level, for skills and training needs are considered. The sectors examined include:

- 3.1 Dairy Sector
- 3.2 Meat Sector
- 3.3 Fruit and Vegetable Processing Sector
- 3.4 Grains & Starches Processing Sector
- 3.5 Bread, Biscuits, Sugar, Chocolate and Sugar Confectionery
- 3.6 Bread Sector
- 3.7 Food Ingredients
- 3.8 Prepared Consumer Foods (PCF).

While seafood is an important sector, it has not been included for detailed analysis here as the training needs and recommendations for seafood processing training are clearly outlined in the Ministerial Task Force on Training and Employment for the Irish Seafood Industry 2001 (Appendix 4.1) and BIM's Integrated Training Plan for the Irish Seafood Industry 2000-2006.

The Drink and Tobacco sectors do not come within the scope of this study.

3.1 Dairy Sector

The Irish dairy sector is the second largest sector, after meat, of the Irish food industry, with a 1999 output of €2.8 billion and employing over 7,000 people. It is highly concentrated, with the top three processors accounting for two-thirds of the total milk processed in Ireland. Given the EU imposition of milk quotas in 1984, processors have attempted to grow their businesses by acquisition and internationalisation and, over time, this process has resulted in a high degree of concentration. The industry is highly export oriented. In line with the high degree of seasonality in Irish milk production, the industry remains very reliant on commodity products and EU support in the forms of export refunds and intervention. However, some branding success has been achieved, with the Kerrygold brand for butter being a notable example.

Table 3.1: Profile of the Dairy Sector in Ireland

Gross Output	€2.8 billion	
Number of Facilities	85	
Nos. of Employees by Facility	Facilities	Total Persons Engaged
Under 10	15	80
10-19	16	195
20-49	13	422
50-99	16	979
100-199	16	2,112
200 and over	9	3,334
	85	7,122
Total Numbers Employed	7,122	
Of which:		
- supervisors and operatives	4,841	
- apprentices	29	
- clerical staff	875	
- admin/technical staff	1,363	
- proprietors/family	14	

Source: Census of Industrial Production, 1999. Central Statistics Office.

Industry Structural Features

The key features of the dairy sector may be summarised as follows:

- At farm level, milk production is limited by EU milk quotas.
- The processing industry has concentrated rapidly over the past decade, with three players accounting for two-thirds of processing.
- The CAP, in terms of milk quota, export refunds and intervention, has a huge influence on the Irish dairy industry by effectively placing a limit on milk production and facilitating a focus on commodity products and Third Country markets.
- Seasonality of milk production and market peripherality remain severe limitations in terms of changing the product mix (moving into higher margin fresh dairy products).
- In the case of the larger players, ownership structures have been transformed from farmer cooperatives to (farmer controlled) plcs. This has facilitated greater access to capital and has allowed these companies to build scale and internationalise more quickly.

Drivers-of-Change

- **CAP and WTO:** Under the CAP, support prices for butter and skim milk powder are set to fall by 15% by 2006 while milk quotas are to remain in place. However, in terms of the intervening period, the policy support environment will remain stable. The long term policy direction is clearly for lower levels of support which are likely to impact heavily on those processors most reliant on intervention and third country markets.
- **Consumption Trends:** Arising from consumer lifestyle changes, health concerns and changing attitudes to food, the dairy product mix at consumer level is changing gradually. Demand is growing for fresh dairy products and cheeses, while butter and skim milk powder demand is trending downwards.

- **Processor Consolidation:** In line with international trends, the Irish dairy industry is consolidating rapidly. This is increasing buying power over suppliers and is also reducing the number of smaller industry players.

Anticipated Trends

- At farm level, overall milk production will remain stable in line with milk quota regulations. Smaller dairy farmers will continue to exit the industry. This will benefit the processing sector as more larger, more progressive dairy farmers emerge.
- Processor consolidation and the development of improved processing technology will continue the trend of capital substituting for labour. Overall industry employment is likely to decline over the medium term, especially in the operatives category.
- Processors will increasingly focus on consumer (dairy) product markets in the EU, either with a view of direct supply or more likely, to supply specific, tailored ingredients to such consumer food manufacturers.

Implications for Training Needs

1. Food industry regulation will continue to be a primary driver of the need for staff training, particularly in basic food handling, hygiene and HACCP standards.
2. As retailer and food manufacturers respond to evolving market requirements, they will impose higher standards and new demands on processors, thereby requiring further staff training in traceability and quality assurance in particular.
3. Quality control and quality assurance will increasingly be embedded in the role of production operatives. Training will need to be provided in this regard.
4. The need for new product development will accelerate as processors focus more on commercial EU markets. Accordingly dairy scientists and dairy R&D personnel will be increasingly in demand. Training needs will increase in both technical R&D and the commercialisation of product innovations and new product developments.
5. Given the drive to maintain competitiveness, particularly in commodity markets, production management and production efficiency will be increasingly important. Accordingly, training needs in this area will also increase.
6. The move towards a customer and market-led approach also has implications for training. Market research, market development and customer relationship management skills will be required. Existing sales and customer service staff will have to be assessed and re-trained in light of these requirements.
7. Given the speed of change in the dairy sector, and the increasing demands on organisations and staff, general management skills will become even more central to success. Ongoing management training will thus be required.

3.2 Meat Sector

The meat sector is the largest segment of the Irish food industry in terms of both turnover and employment, employing 15,000 people directly and generating a gross output of €3.5 billion in 1999. The meat processing sector is characterised by low profit margins, typically 1.5-2.0%, with most of the industry output being traded as commodity product. Overall profitability is thus driven by volume throughput and tight cost control. Given its high degree of export orientation, WTO trade policy, with respect to export refunds, is a particularly important driver of the industry. In addition, the influence of CAP policy on livestock numbers remains a key long-term driver.

Table 3.2: Profile of the Meat Sector in Ireland

Gross Output	€3.5 billion	
Number of Facilities	176	
Nos. of Employees by Facility	Facilities	Total Persons Engaged
Under 10	34	198
10-19	26	349
20-49	37	1,218
50-99	23	1,673
100-199	34	4,724
200 and over	32	6,903
	176	15,065
Total Numbers Employed	15,065	
Of which:		
- supervisors and operatives	12,459	
- apprentices	83	
- clerical staff	1,142	
- admin/technical staff	1,314	
- proprietors/family	67	

Source: Census Of Industrial Production, 1999. Central Statistics Office.

Industry Structural Features

Key features of the meat sector are:

- 130,000 farmers involved in livestock production. This includes both part-time and full-time farmers. Thus the meat industry must deal with a huge number of small suppliers, impacting on their ability to ensure product consistency. However, it also means that supplier power is low.
- Huge influence of CAP policy on livestock numbers, effectively limiting meat industry throughput as a result of EU milk and suckler cow quotas.
- 15,000 employed in the meat processing sector.
- High export orientation, with the beef industry, in particular, being one of the few industries where Ireland is a global player. Beef exports averaged over 500,000 tonnes annually in the late 1990s.
- Virtually all Irish meat traded is as a commodity product.
- Small factory sizes, with 55 percent of all units having less than 50 staff.

Drivers-of-Change

- **Food Safety:** Farm assurance schemes and supply chain traceability that are independently verified and nationally accredited are prerequisites for competing in EU markets. The meat processors play the central role in such schemes.
- **Trade Policy:** The policy direction towards liberalisation of world markets is continuing. The impact of further reductions in export refunds remains a serious threat to the competitiveness of the EU meat industry.
- **Nationalisation of Markets:** The preference for domestic product, reinforced by recent international food scares, has accelerated. As a major exporter, this presents a serious challenge for the Irish industry.

- **Convenience:** The international beef industry is beginning to respond to consumer demand for more convenient products. R&D emphasis is being placed on ready-to-cook, ready-to-heat and ready-to-eat products which will drive change over the medium term.
- **Globalisation of Retailing:** Although global sourcing is not yet a reality in the fresh meat trade, it will create both threats and opportunities for suppliers over the medium term.

Anticipated Trends

- The long-term EU policy drift is to de-couple premia payments from production. While long-term this will reduce livestock numbers, it seems likely that industry throughput will broadly be maintained at current levels over the coming 3-5 years.
- Current industry over-capacity, likely long-term future throughput declines, and retailer trends towards supplier rationalisation all combine to mean that meat (beef) industry rationalisation is likely over the medium term. The twin trends of declining international red meat consumption and increasing white meat consumption seem set to continue over the medium term.
- These market forces will impact particularly on the smaller, domestic factories.
- In line with anticipated industry rationalisation, employment will contract somewhat over the coming five years. This will impact particularly on the number of operatives employed in the sector.

Implications for Training Needs

1. Evolving market and buyer requirements, combined with food safety regulations, will continue to be key driving forces for meat industry safety and hygiene training.
2. It seems probable that independent, certified basic food handling and hygiene courses will become essential for meat industry operatives over the medium term.
3. The drive for convenience and an increased rate of new product development will increase the need for meat technologists and meat R&D personnel. If red meat consumption continues its long-term decline, retailers and processors will attempt to address this by increasing the convenience of meat products. Reduced preparation and reduced cooking times will be central elements of this.
4. Noting the competitive pressures evident in the sector, and its general level of over-capacity, continued emphasis will be placed on production management and efficiency. In addition, the relatively tight labour market increases the need for good people management skills. As a result, there will be increased interest in management training in these elements of the business.
5. Marketing skills, particularly category management and CRM, will rapidly increase in importance. This is mainly resulting from retailer concentration and retailer efforts to rationalise their supplier base. In line with this, suppliers must increase their efforts to tighten and deepen their relationships with key retail accounts.

3.3 Fruit & Vegetable Processing Sector

The fruit and vegetable sector has traditionally been subject to free market forces, in contrast to the range of EU support mechanisms that underpin most other primary agricultural sectors. In value terms, it is a relatively small segment of the food industry, with gross output estimated at €158 million in 1999. The primary products within the sector are potatoes, fruit and berries (dominated by apples), and fresh vegetables (tomatoes, carrots and mushrooms alone accounting for 40% of all vegetables in value terms). The industry is mainly focused on serving the domestic market and is consolidating rapidly in response to retail buyer pressures in particular.

Table 3.4: Profile of the Fruit and Vegetable Processing Sector in Ireland

Gross Output	€158 million	
Number of Facilities	41	
Nos. of Employees by Facility* (*incl 6 oil/fat plants with 83 staff)	Facilities*	Total Persons Engaged*
Under 10	16	85
10-19	11	151
20-49	12	338
50-199	5	608
200-249	3	653
Total	47	1,835
Total Numbers Employed	1,752	
Of which:		
- supervisors and operatives	1,373	
- apprentices	5	
- clerical staff	175	
- admin/technical staff	182	
- proprietors/family	17	

Source: Census Of Industrial Production, 1999. Central Statistics Office.

Industry Structural Features

The key features of this sector are:

- Subject to free market forces.
- Focused mainly on the domestic market with mushroom production being the main exception.
- Market can fluctuate hugely in response to international prices, weather and season.
- Growth in the value of edible horticulture output in Ireland is driven primarily by two segments – potatoes and mushrooms.
- Produce sector concentration varies by region, e.g. potatoes being grown nationally, protected crops (tomatoes, lettuce) mainly in the Greater Dublin area, soft fruit mainly in the South-East.

Drivers-of-Change

- **Consumer Requirements:** Changing consumer lifestyles and, in particular, the increasing need for more convenient consumer products. In addition, greater consumer emphasis on healthy eating will boost long-term demand for fruit and vegetables.
- **Supply Chain Efficiency:** Consolidation of the whole supply chain is a key driver, with major consolidation of the processing industry likely in response to centralised purchasing and distribution, the introduction of cool chain handling to maintain product quality and the more demanding buyer requirements.
- **Food Safety:** Higher standards of food safety, product traceability and quality assurance.
- **Labour Availability:** Shortage of seasonal and casual labour is of major concern to this sector. Combined with increasing wage rates, it is accelerating the move towards more capital-intensive enterprises.

Anticipated Trends

- Rationalisation of the processing sector in response to buyer and market pressures.
- Evolving consumer requirements are resulting in higher demand for value-added, prepared and processed products. Organic products are emerging as a significant niche.
- Substantial investment required to up-grade processes, equipment and standards.
- Ongoing replacement of manual and unskilled labour by automation.

Implications for Training Needs

1. Evolving market and buyer requirements, when combined with food safety regulation, are the main drivers of training needs. Consequently, basic food handling, hygiene and safety courses are increasingly being required.
2. The growing demand for value-added and more convenient products is stimulating the need for more R&D. Accordingly, food technologists and scientists will increasingly require further training to re-align with market realities.
3. As the fruit and vegetable industry becomes more automated and technology intensive, there will be an increased need for such training for operatives in the industry.

3.4 Grains & Starches Processing Sector

This is a small sector of the food processing industry with 1999 output estimated at €136 million and employment standing at just over 500 people. The domestic flour industry is now highly concentrated with the recent Greencore (Odlums) acquisition of the milling interests of IAWS (Bolands). This business is primarily focused on the home market. The malting industry in Ireland is also dominated by Greencore but is more export oriented.

Table 3.5: Profile of the Grains and Starches Processing Sector in Ireland

Gross Output	€136 million	
Number of Facilities	28	
Nos. of Employees by Facility	Facilities	Total Persons Engaged
Not meaningful to complete as the CSO grouped NACE 156 and 157 together in this analysis. This adds 77 extra animal feed units and an extra 2,157 staff to the breakdown of employees by facility.		
Total Numbers Employed		510
Of which:		
- supervisors and operatives		311
- apprentices		1
- clerical staff		85
- admin/technical staff		113
- proprietors/family		0

Source: *Census Of Industrial Production, 1999. Central Statistics Office.*

Industry Structural Features

Key features of this sector are:

- Small segment of the Irish food industry
- Highly concentrated
- Throughput, scale and efficiency are key business drivers
- Large influence of UK prices on domestic Irish prices

Drivers-of-Change

- **Convenience:** Consumers demand for convenience resulting in new product development such as the introductions of Quick (baking) Mixes, and more user friendly baking products.
- **Retailer and Manufacturer buying power:** In particular, this is evidenced in their need for new product development and for in-store service. The advent of in-store bakeries is pushing product development requirements back onto suppliers. Retailers want to minimise in-store preparations, to de-skill their operations and are pressurising suppliers to provide them with products that just require bake-off or minimal preparation.
- **Industry Consolidation** in the flour milling sector. This is evidenced by recent development with Greencore and IAWS.
- **Capital Investment:** This is reducing the need for unskilled labour and boosting both productivity and efficiency, allowing Irish mills to meet international competition.

Anticipated Trends

- Consolidation and rationalisation of the sector is nearing an end, given its current high degree of consolidation.
- Import competition will maintain the pressure for competitiveness.

Implications for Training Needs

1. Baking technology and product R&D skills will be increasingly important. This is being driven by consumer requirements for greater convenience.
2. Retailer and manufacturer imposed product quality standards will dictate the need for training in food handling, hygiene and traceability.
3. Production management, efficiency and productivity are hugely important in this industry. Accordingly, management will need be kept abreast of latest processing technology developments.
4. Given the consolidation in the industry on both the supply and buying side, customer relationship management skills will become increasingly important.

3.5 Bread, Biscuits, Sugar, Chocolate and Sugar Confectionery

In order to provide a more meaningful level of disaggregation, the bread sector is separated here from the biscuit, sugar, sugar confectionery and chocolate sectors.

The biscuit, sugar, sugar confectionery and chocolate sectors are a reasonably significant element of the food industry in their own right, accounting for over 4,500 jobs. The sector is characterised by a small number of multinational companies which account for the bulk of employment, e.g. Cadburys, Ferrero and Irish Biscuits, and a large number of small, local or specialised companies. The sector is

noted for its high level of brand development and consumer brand awareness, with private label generally being focused on the biscuit sector. This makes new product introductions very difficult and costly for smaller players. Given buying concentration in the retail sector, smaller producers are under increasing pressure.

Table 3.6: Profile of Biscuits, Sugar, Chocolate and Sugar Confectionery Sectors in Ireland

Gross Output	€731 million
Exports	
Number of Facilities	43
Total Numbers Employed	4,550
Of which:	
- supervisors and operatives	3,505
- apprentices	27
- clerical staff	476
- admin/technical staff	529
- proprietors/family	13

Source: Census Of Industrial Production, 1999. Central Statistics Office.

Drivers-of-Change

- **Consumer dynamics:** Lifestyle changes, higher disposable incomes and greater time pressures are impacting directly on these sectors. In particular, there is more snacking and 'eating-on-the-go'.
- **Market Fragmentation:** The market is fragmenting with the traditional mass-market being squeezed into both the discount and the premium segments.
- **New Channels:** Furthermore, relatively new channels such as petrol forecourts are gaining in importance. Increasing penetration and consumer use of vending machines is also worth noting.
- **Health Concerns:** These are becoming increasingly important with low fat, low calorie and low sugar options emerging. Consumer demand for sugar has reflected these trends. Conversely, the demand for luxury/indulgent chocolate and confectionery products is growing.
- **Retailer Concentration:** Combined with their buying power, their drive for supply chain efficiency and consequent supplier rationalisation are major factors driving industry change.

The implications of the drivers-of-change for these sub-sectors in terms of anticipated trends will be combined and considered together with the implications for the Bread sub-sector which is profiled below.

3.6 Bread Sector

This is a relatively small sector of the food industry but is very important to the retail trade in particular as it is such a consumer staple. The sector has several large national players and a host of local and regional producers. It has rationalised significantly in recent years as competition focused on price competitiveness and scale. The multiple retail drive for supply chain efficiency and the emergence of new technologies in the form of in-store bakeries and par-baked dough products has further intensified competitive pressures. Over the past few years, branded bread has strengthened its market share as suppliers have greatly increased the consumer marketing efforts and retailers have eased back from own label bread.

Table 3.7: Profile of the Bread Sector in Ireland

Gross Output	€273 million
Number of Facilities	146
Total Numbers Employed	4,171
Of which:	
- supervisors and operatives	3,497
- apprentices	19
- clerical staff	261
- admin/technical staff	265
- proprietors/family	129

Source: Census Of Industrial Production, 1999. Central Statistics Office.

Drivers - of - Change

- **Market Forces:** The need for competitiveness and efficiency in the supply chain are likely to result in further industry rationalisation. There is considerable pressure on suppliers for new product development to drive new business for both themselves and their retail customers. Local/craft bakeries are most at risk from the bakery industry rationalisation process and significant drops in the numbers of local bakeries are expected.
- **Market Fragmentation:** Arising from both consumer lifestyle requirements and increasing consumer affluence, there is a noticeable trend towards higher quality branded breads and furthermore, towards speciality, artisan and regional breads.
- **In-Store Bakeries:** Retailers are leading the drive towards in-store bakeries with the central question being whether they will go the Private Label or branded routes in terms of the in-store bakery operation.
- **New Channels:** The number of bake-off outlets, whereby the retailers purchase par-baked products from suppliers such as Cuisine-de-France and bake in-store on a daily basis, will continue to rise rapidly.

Table 3.8 below profiles the whole confectionery and related products category in terms of numbers of facilities and scale of employment.

Table 3.8: Analysis of Employment by Units

(Bread, Biscuits, Sugar, Chocolate, Sugar Confectionery, Macaroni, Tea, Coffee, Condiments, Homogenised food preparations, Other)		
Number of Facilities	233	
Total Numbers Employed	11,378	
Nos. of Employees by Facility	Facilities	Total Persons Engaged
Under 10	79	457
10-19	53	737
20-99	74	2,854
100 and over	27	7,330
	233	11,378

Source: Census Of Industrial Production, 1999. Central Statistics Office.

Anticipated Trends

- The baking industry is unique in that the move towards production centralisation is resulting in a move from fresh to frozen par-baked product.
- Market fragmentation in the chocolate, confectionery and bakery markets will continue. In line with this, market responsiveness will increase in importance, thereby accelerating the need for closeness to the customer and flexibility.
- The need for supply chain efficiency will increase as retailers look to take costs out of the supply system.
- Given that all of these market segments are tending towards a state of maturity, new product development will be a key means of business development.
- Following intense rationalisation, the US baking industry is now reverting towards more speciality and regional products. This trend could well be followed over the longer term in Ireland.

Implications for Future Training

1. Food hygiene, handling and traceability requirements, whether driven by regulation or by buyer requirements, will continue to be central to staff training requirements.
2. New product development will be essential for new business development. In line with this, food technologists and R&D personnel will need to be continually trained to leading-edge standards.
3. As the business becomes increasingly automated and technologically intensive, there will be an increased need for such training for operatives.
4. Equally, technology offers the possibilities of new product and process development and in this regard, R&D and technical staff will require continual development in this area.
5. Production and people management skills will need to be continually updated, in line with market developments and in order to maintain competitiveness.
6. For branded and FMCG sectors, marketing will remain key to success. Accordingly, sales and general management will have to be continually developing and updating their skills.

3.7 Food Ingredients

Given the nature of the food ingredients industry, whereby its output is derived from other primary processing sectors and then sold on for further processing, gathering precise data in terms of industry output and employment presents a challenge.



Bord Bia estimates that there are some 35 companies involved in food ingredients in Ireland, with food ingredients companies being defined as those that sell their output for further processing. Total sales were put at €1.5 billion in 2001 by Bord Bia, with exports constituting €1.26 billion or 84% of that. Dairy ingredients are the most important category of ingredients but sub-sector breakdowns are not available. The UK is the dominant export market, accounting for over half of exports, with other EU markets accounting for a further 15%. The balance is traded to Third Country markets.

Industry Structural Features

Specific statistics are not available. The sector is very diverse, ranging from large, international dairy companies to small, specialised ingredient and flavouring companies. While the dairy ingredient sector is the dominant food ingredient sector in Ireland, all companies across the food ingredients industry are characterised by high demand for technical capability and an emphasis on R&D.

Furthermore, given the nature of the industry, their customer base is composed entirely of food manufacturers. Thus, trade marketing and customer relationship management are important elements of their business.

Drivers-of-Change

- Consumer Dynamics – changing attitudes, lifestyles, demographics. In particular, consumer health requirements are set to become a major driving force (functional foods, nutraceuticals).
- Food industry consolidation (on both the supplying and buying side).
- Major food manufacturers are shifting from manufacturing to food assembly.
- The shift from retail to food service means that ingredient suppliers must invest more in understanding the differing requirements of manufacturers supplying retail and food service channels.
- Globalisation of food menus and food companies.
- Consumer demand for convenience means ingredient suppliers must be continually developing specialised ingredient solutions for such products, particularly in the areas of facilitating reduced preparation and cooking times.

Anticipated Trends

- In order to take advantage of their suppliers' technical capabilities and capital investment, food manufacturing companies will increasingly rely on their ingredient suppliers for ingredient solutions and for new product development initiatives.
- Manufacturers will move towards having fewer, deeper relationships and strategic partnerships with a smaller number of ingredient companies. Consequently, ingredient companies need to invest in understanding their customers and in building/maintaining preferred supplier status.
- Furthermore, as food manufacturers go global, their ability to source ingredients world-wide will put increasing price and volume pressures on suppliers.
- In addition, suppliers must invest in understanding consumer trends and dynamics in order to properly tailor their ingredients into future, new value-added consumer products.
- The global trend towards increasing food consumption via the food service channel means suppliers must take cognisance of this route and understand the implications of dealing with food service customers. This requires different skills than dealing with manufacturers that focus on the retail channel. In particular, suppliers must understand flavour and recipe trends and developments.
- The main consequence of these factors is that ingredients companies will need to invest in maximising efficiency and productivity in their commodity ingredient businesses to maintain price competitiveness.
- Equally, they will need to invest heavily in increasing their technical R&D capabilities in order to both build new business and maintain their existing business relationships by providing value-added ingredient solutions to their manufacturing customers.

Implications for Training Needs

1. As in all sectors of the food business, food safety, quality assurance and traceability are essential requirements and, in line with both regulatory and buyer requirements, companies will have to invest in staff to achieve and maintain standards.
2. Suppliers will need to develop first-class trade marketing and customer relationship management skills. Accordingly, both sales and technical executives will need training in this regard.
3. Ingredient companies will also need to develop consumer market research skills to fully understand consumer dynamics and changes in product requirements.
4. Technical R&D skills will increase further in importance. Continual training will be required to keep the research team abreast of the latest technical developments.
5. Focus must be developed on the successful commercialisation of product innovation and product development.

3.8 Prepared Consumer Foods (PCF)

This sector of the food industry has been characterised by rapid growth in both output and exports in recent years. Significantly, it is also projected to continue to grow rapidly over the medium term. At present, half of total output is exported with the UK being the dominant market, accounting for three-quarters of total exports. Responsiveness to consumer needs and an excellent understanding of both trade buyer and consumer requirements are characteristics of this sector. Consequently, new product development and rapid product range developments are key requirements for success. Four distinct routes to market are evident, namely branded, own label, food service and co-pack (i.e. where companies produce and pack for branded manufacturers).

Table 3.10: Profile of the PCF Sector in Ireland

Gross Output (2000)	€2.3 billion
Exports	€1.15 billion (three-quarters to UK)
Number of Companies	164
Of Which	
- Convenience	43
- Confectionery/Snacks	39
- Processed Meat	30
- Processes Seafood	30
- Soups/Sauces/Veg	16
- Other	6
Total Numbers Employed	13,944
Of which:	
Average per company	86
East Region average (80 companies with 77% of total employed)	133
No. of Companies	Sales (€ million)
31	< €1m
114 (70% of companies)	< €10m
4	> €100m

Source: Prepared Consumer Foods Group Strategy 2002-2004.

Industry Structural Features

Key features of this sector are:

- 164 companies across six main sub-segments.
- The three largest sub-segments – confectionery/snacks, convenience foods and processed meats account for just over two-thirds of industry sales.
- Relatively small company size, with 70% of companies having sales of less than €10 million.
- Average factory size 86 employees.

Drivers - of - Change

According to the Prepared Consumer Foods Group, there are three key factors driving change:

- **Increasingly sophisticated consumers:** Consumers today are concerned about healthy eating, convenience and have a sharper and more discerning attitude towards price and value. Changes regarding food safety, lifestyle and buying behaviour have direct implications for producers.
- **Changing Markets:** A particular issue here is ongoing retailer concentration which is facilitating even greater retailer buying power. In conjunction with this trend, competitive pressures are forcing supplier rationalisation, which threatens weaker companies and provides opportunities for those that are adequately resourced.
- **Technological Innovation:** Changes in technology are influencing both in-home and out-of-home food preparation. Increasing microwave penetration is impacting significantly on in-home food preparation while technology now means that the food-service industry can buy-in both semi and fully prepared meals.

Anticipated Trends

- Given market developments and, in particular, supplier rationalisation among leading retailers and food service operators, there is pressure on Irish companies to achieve scale. Companies are likely to either focus on specific market niches or else consider partnerships, joint ventures and acquisitions as possible developmental routes.
- New product development capabilities will grow in importance as a means of developing the business and as retailers continue to push the task of innovation/NPD onto suppliers. This need is compounded by the relatively short product lifecycles in the PCF sector. Accordingly, investment in people and facilities will be a priority.
- Export market development will remain a priority for PCF companies, given the small size of the domestic market. The costs involved mean that the majority of Irish companies are likely to choose the own label and food service routes-to-market.

Implications for Future Training

1. Food regulation and buyer requirements are likely to be key driving forces in the need for employee training. Emphasis will be centred on basic food handling, hygiene and HACCP procedures.
2. Skills in new product development will be essential for success, given the nature of the Irish and UK PCF markets. Accordingly, emphasis must be placed on developing technical and scientific NPD skills.
3. In line with this, developing successful commercialisation skills for product innovations will also be essential.
4. Investment in marketing skills will be required in order to identify new product opportunities and to maintain close relationships with key accounts.

4. Irish Food Processing Industry – Projected Skills & Training Needs Assessment

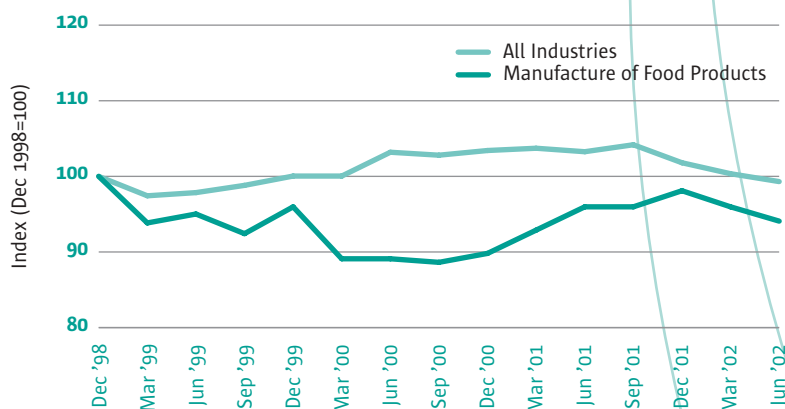
Overview of the Section

This section identifies the macro trends evident in the Irish food processing labour market and the implications for skill levels. The first part of the section identifies the total number of persons employed in the industry and the future outlook for employment and skills. It also analyses the underlying characteristics of labour supply. The second part of the section sets-out the skills identified by survey respondents as being important for future business development, the extent of skills weaknesses and critical gaps arising in the sector.

4.1 Trends in Employment Levels in the Food Processing Sector

Employment in the food processing industry decreased by nearly 6% between December 1998 and June 2002 to 39,700. This contrasts with employment levels in overall industry, which remained relatively constant at the December 1998 level of 258,700.

Figure 4.1: Employment Levels in Food Processing and All Industries



Source: Central Statistics Office, PwC Analysis.

4.2 Future Outlook For Employment and Skills in Food Processing

Forecasting the likely future employment levels in the food processing industry is an exercise fraught with difficulties. Whilst every effort was made through the survey, the direct company interview process undertaken for this study and consultations with relevant state bodies, to quantify the likely future food processing employment levels, it was not possible to do so. Similarly efforts made to quantify the skill composition and qualification levels of the current employees in this sector were unproductive.

The unavailability of information/data which would allow for an analysis of total employees by skill composition/qualification is symptomatic of inherent weakness in HR procedures within the sector. The reason for not being in a position to provide employment forecasts is a different matter. Unlike other sectors of the Irish economy, such as the IT or biotech sectors, where output and employment levels would closely reflect end product demand, output and employment levels in food processing are significantly influenced by a range of factors not directly related to end product demand (see Section 2: Drivers-of-Change) notably agriculture and trade policy.

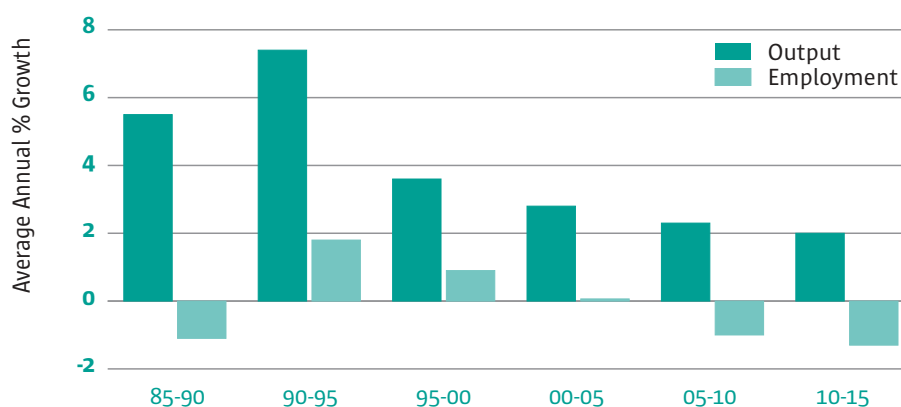
Further compounding the complexities of the policy factors, both future agriculture policy (in the form of the CAP) and future trade policy (as determined by the WTO) are currently under negotiation, with significant changes proposed – changes which have the potential to have far reaching consequences for food processing output and employment.

Agriculture policy developments arguably have the potential to have the most significant impact on food processing employment in the medium term. According to initial projections from the FAPRI Ireland Partnership, under the current proposed reforms of the CAP, employment in food processing is forecast to decline by 4.3% over the period up to 2010. However, it is likely that these proposed reforms will be significantly changed over the coming months as the various EU member states work to negotiate an agreed position on a future CAP.

Assuming a continuation of the current agriculture/trade policy, the ESRI in its latest *Medium Term Review 2001-2007* project that output will continue to rise in the food processing industry, albeit at a moderately reducing growth rate. However employment levels are forecast to remain static in the period 2000-2005 and are expected to decline thereafter (see Figure 4.2), the ESRI states that

“...employment in food processing industries is likely to be currently close to its peak... continued restructuring and international competitiveness will be the driving forces behind the job losses”.

Figure 4.2: Output and Employment in the Food Processing Industry

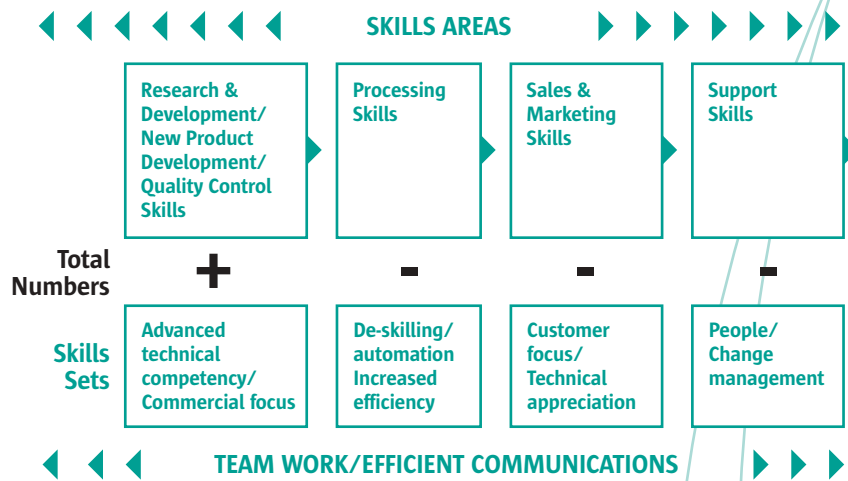


Source: ESRI.

The findings of this study are in line with the ESRI forecast on the future output and employment trends in the food processing industry. Furthermore, based on interviews/research, the overall static-to-decline in numbers employed masks a number of underlying trends (see Figure 4.3).

Given the reasons outlined, any attempt to provide some more specific quantification of forecast employment levels would be likely to be misleading. For the purpose of planning in order to meet the future skill needs of this sector, this quantification is not essential given that no recommendation that there should be additional graduate or other labour supply, with the cost and policy implications that this would entail, is being made.

Figure 4.3: Future Outlook for Employment and Skills in Processing



Source: PwC Analysis.

Implications of Underlying Trends (Figure 4.3)

R & D / N P D / Q A

- Employment expands to meet demand for new product innovation
- Advanced technical competency and commercial skills imperative.

Processing Skills

- Employment Levels to decrease over time
- Industry rationalisation and efficiency of scale
- De-skilling and increased automation result.

Sales and Marketing Skills

- Employment decreases as retailers consolidate
- Customer focus and technical appreciation of foodstuffs essential.

Support Skills

- Employment decreases following plant closures/consolidation
- People and change management skills become critical
- Potential for outsourcing of back office functions.

4.3 Changing Characteristics of the Labour Force in Food Processing

The profile of workers in the food processing industry is expected to alter over the coming years. The two main areas where these developments will be most discernable are among graduate entrants and production/operative staff.

The survey results did not identify any current shortfall in graduate numbers available to the food processing industry. Furthermore, no evidence could be found in the survey to suggest that the industry will significantly increase demand for graduates over the coming five years.

In relation to production/operative staff, the survey asked two key questions. The first question asked survey participants if they anticipated employing higher numbers of operative staff over the coming five years. The second question asked survey respondents to numerate the number of immigrants they employed and to indicate if the demand for this type of labour was likely to increase or decrease in the period up to 2007.

The survey findings indicated that the number of operatives is likely to remain static or in slow decline. However, respondents also indicated that immigrant workers were likely to form a stronger proportion of their workforce going forward (see below, Section 4.4). These survey findings suggest a churn effect between local and immigrant labour while overall demand remains relatively constant. The causal factors affecting this churn rate include: low rates of pay compared to other industries; a labour market near full employment providing greater opportunities to Irish workers; and an industry associated with having an unpleasant working environment characterised by cold and damp conditions.

4.4 Dependency on Immigrant Workers

A large increase in the number of immigrant workers employed in the food processing sector has emerged as a significant feature in recent years. Based both on the survey results and interviews with a number of key informants, the following points are noteworthy in this context.

According to data compiled by the Department of Enterprise Trade and Employment, the total number of work permits issued to foreign workers (i.e. workers coming to Ireland from outside the EU) over the period 1999 to September 2002 was as follows:

Table 4.1: Total number of work permits issued to immigrant workers

Year	Total Number of Work Permits Issued
1999	6,244
2000	18,006
2001	36,436
2002 (January-September)	31,157

Source: Dept Enterprise, Trade & Employment.

While individuals qualifying for these work permits are drawn from a large number of countries, a significant proportion of applicants in recent years have arrived from Eastern Europe, including the Accession 10 Eastern European countries, as highlighted in the breakdown of the 2000 and 2001 figures presented below.

Table 4.2: Region of origin for immigrant workers 2000 & 2001

Applicant's region of origin	Number of Work Permits Issued	
	2000	2001
Accession 10 Countries	6,257	15,627
African	1,016	3,097
Asian/Russian	6,825	13,053
S. American (Mostly Brazil)	829	1,192
Other	3,079	3,467
Total	18,006	36,436

Source: Dept of Enterprise, Trade & Employment.

From the available statistics, the following is the breakdown of the sectors where those issued work permits were employed in 2001.

Table 4.3: Sectors where immigrant workers were employed in 2001

Sector	Total Employed
Agriculture & Fisheries	5,714
Catering	9,129
Domestic	521
Education	480
Entertainment	1,021
Exchange Agreements	61
Industry	3,119
Medical & Nursing	2,252
Service Industry	14,018
Sport	121
Total	36,436

Source: Dept. Enterprise Trade & Employment.

The above breakdown, however, does not allow for a clear identification of those employed in the food processing sector per se. Based on the categorisation of employment as presented above it is possible that food processing employment could occur under a number of headings including: agriculture and fisheries; industry and/or service industry which combined account for 22,851 or almost 63% of the work permits issued.

Based on the results of the industry survey, it would appear that all sub-sectors of the food processing industry have recorded an increase in the number of immigrant workers employed since 1999, with the meat sub-sector contributing significantly to the overall increase in the demand for immigrant labour – indeed the meat processing industry sub-sector is currently significantly dependant on immigrant workers as a source of labour.

The majority of immigrant workers employed in the food processing industry, while having a strong work focused ethos, are employed in low-skilled jobs. This is an industry feature which is likely to continue, particularly in the low-value commodity sectors that account for the bulk of employment for immigrant workers.

According to industry sources, the rationale for employing emigrant workers in the food processing industry includes:

- the shortage of Irish staff willing to work in a food processing environment – particularly given the alternative employment opportunities available in recent years; and
- the relatively low wage cost associated with immigrant workers (willing to work on the minimum wage).

A majority of respondents who completed the industry survey indicated that they intend to increase the number of immigrant workers employed in their businesses going forward, assuming favourable government policy in this regard.

From May next year, citizens from the enlargement countries will be free to work in Ireland without restriction/work permit requirements. Immigrant workers from all other countries will continue to require work permits.

Whilst immigrant workers employed in the food industry for the most part are involved in low-skilled activities, according to the survey respondents it is important that this group of workers receive basic training in areas such as: language skills (including on-line language skills); basic food hygiene; and food health and safety training. Employers need to ensure that staff language skills are adequate to meet customer demands in the critical areas related to food safety/meeting food safety plans/procedures (Hazard Analysis Critical Control Points (HACCP) plans, etc.)

In designing a training response to address the training requirements of immigrant workers, the short-term nature of the employment contracts of this group of employees (under the current work permit system) and the potential barrier to training that this feature of employment can present, will have to be taken into account.

4.5 Skill Gaps in the Irish Food Processing Industry

Methodology

(i) Identification of the various food processing skill sets

Interviews were undertaken with a number of leading food processing companies drawn from all of the various food processing sub-sectors along with all of the relevant state agencies/representative organisations.

Based on these interviews a range of the various skill sets required for the food processing industry (both current and potential future requirements) were identified and categorised into one of four-sub categories, namely:

1. R&D/New Product Development (NPD)/Quality Control (QC);
2. Processing skills;
3. Sales and marketing skills; and
4. Support skills.

Diagram 4.1 presented above provides a list of the various skill sets identified under each of these headings.

(ii) Identification of the critical skill gaps

Having identified the various current and potential future skill sets required by food processing companies, a detailed survey of food processing companies was undertaken. The resulting survey data was tested in an industry workshop for validity purposes. The aim of the survey was to identify:

1. the views of the various companies surveyed on the importance of each of the skills areas identified to the future development of their businesses; and
2. the views of the various companies surveyed on their relative strength or weakness with respect to the these same skill areas.

- (a) The feedback from the companies surveyed with respect to the skill areas considered important for their future business development were plotted on web charts. On these charts those skill areas which were scored 4 or 5 by the survey respondents are highlighted (by a tick on the chart) as these are considered to be the skill areas of critical importance going forward. For each category of skill sets (categories defined above) a web chart is presented on the following pages, under the heading 'Skills Important for Future Business Development', which outlines the results of this component of the survey.
- (b) On a second series of web charts the feedback from the companies surveyed with respect to their views of their relative strength/weakness for each of the skill set areas was also plotted. For each of the defined skill set categories a web chart is presented on the following pages, under the heading 'Extent of Skill Weakness', which presents the feedback from this component of the survey.
- (c) On this second web chart (Extent to Skill Weakness) for each of the defined skill categories the critical skill gaps are highlighted (by a tick on the chart). A critical skill gap in this context was considered to exist where a company scored a particular skill area as critical to their future business development (score of 4 or 5) and also scored this same skill area as an area of significant weakness (score of 4 or 5) for their particular business.

On the following pages the web charts mentioned in Steps (a) and (b) above are presented as Figure 4.5, 4.6 and 4.7 need to include in methodology the fact that the survey data was tested in a workshop, etc.

Figure 4.5: Categorisation of Skill Sets

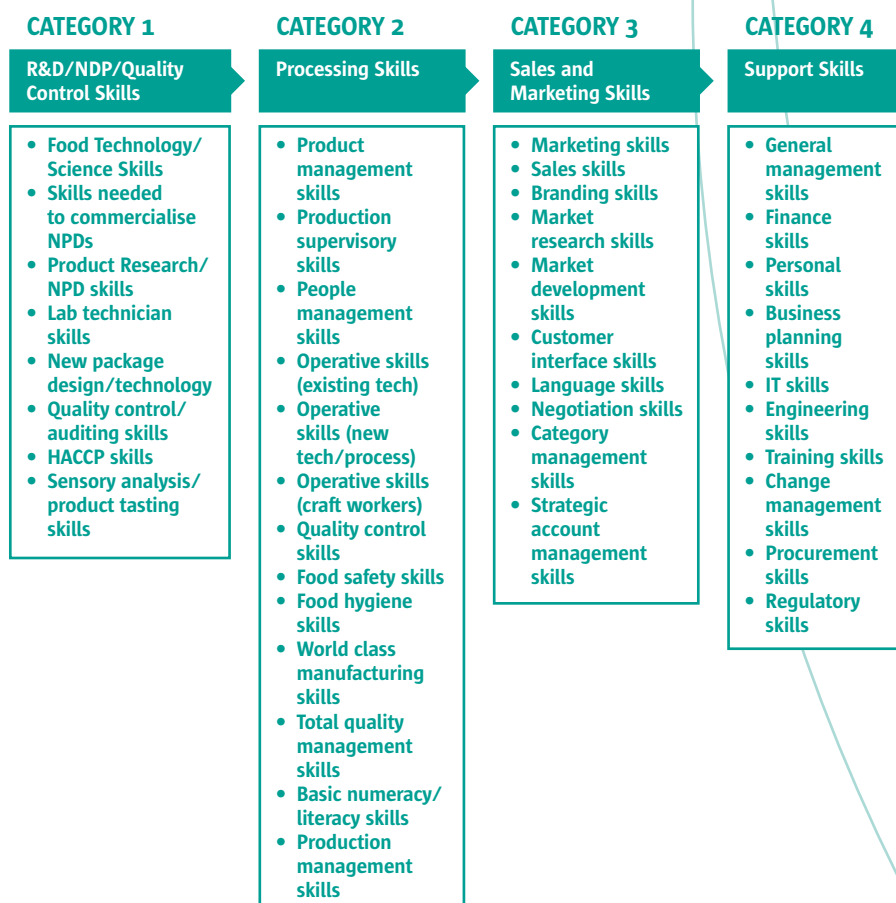
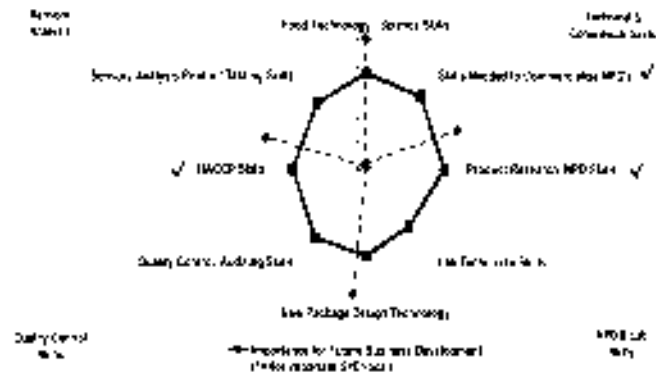
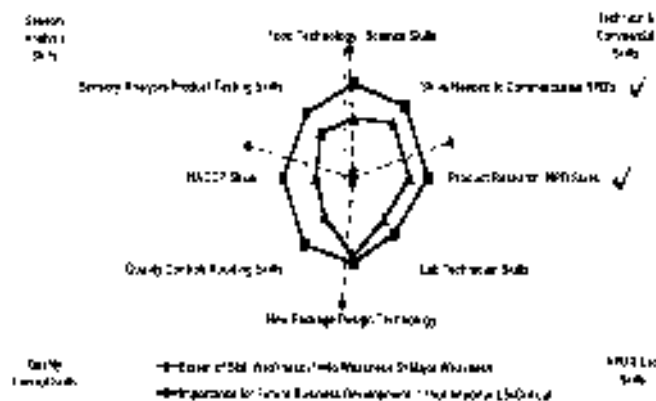


Figure 4.6: Skills Important for Future Development – R&D/NPD/Quality Control



Source: PwC Survey Analysis.

Figure 4.7: Extent of Skills Weakness in R&D/NPD/Quality Control



Source: PwC Survey Analysis.

Sub Category: R&D/NPD/Quality Control

(a) Skills important for future business development

Under this heading respondents identified a range of skill areas as important to their future business development, with most respondents selecting the following skill set as critical to the future of their business:

- Skills needed to commercialise NPDs
- Product Research/NPD Skills
- HACCP Skills.

(b) Extent of Skill Weakness

For this sub-category of skills, the majority of respondents identified the following skill sets areas of weakness for their companies:

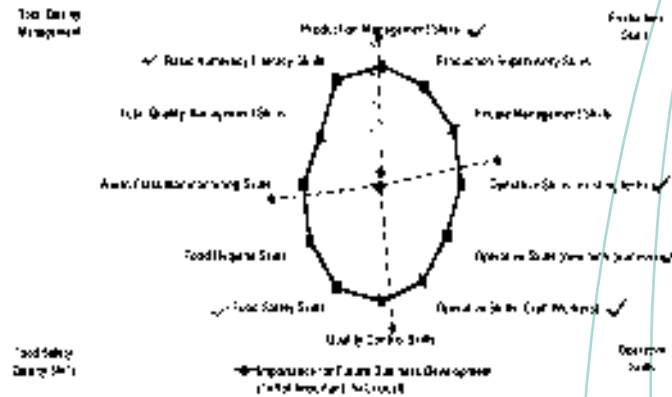
- New package design/technology
- Skills needed to commercialise NPDs
- Product Research/NPD Skills.

(c) Critical Skills Gaps

Based on the above feedback it is possible to conclude that critical skill gaps exist in the following areas

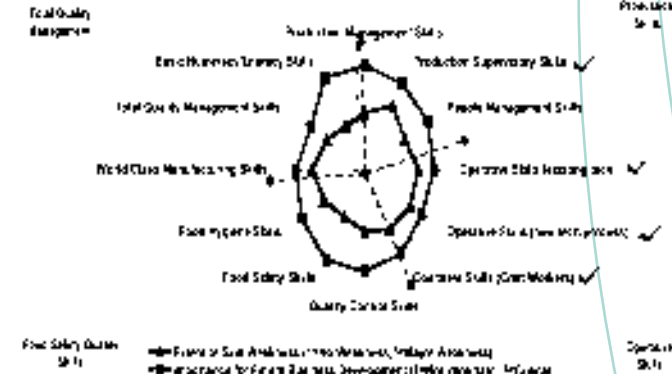
- Skills needed to commercialise NPDs
- Product Research/NPD Skills.

Figure 4.8: Skills Important for Future Development – Processing Skills



Source: PwC Survey Analysis.

Figure 4.9: Extent of Skills Weakness in Processing Skills



Source: PwC Survey Analysis.

Sub Category: Processing Skills

(a) Skills important for future business development

Under this heading respondents identified a range of skill areas as important to their future business development, with most respondents selecting the following skill set as critical to the future of their business:

- Production Management Skills
- Operative Skills (existing technology)
- Operative Skills (new technology/process)
- Operative Skills (craft workers)

- Food Safety Skills
- Basic Numeracy/Literacy Skills.

(b) Extent of Skill Weakness

For this sub-category of skills, the majority of respondents identified the following skill sets areas of weakness for their companies:

- Production Supervisory Skills
- Operative Skills (existing technology)
- Operative Skills (new process)
- World Class Manufacturing
- Operative Skills (craft workers).

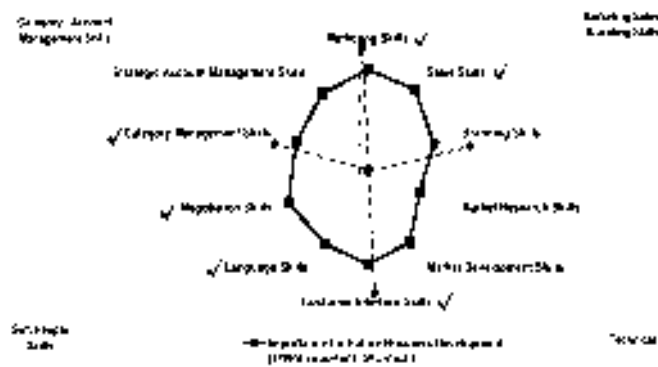
(c) Critical Skills Gaps

Based on the above feedback it is possible to conclude that critical skill gaps exist in the following areas:

- Production Supervisory Skills
- Operative Skills (existing technology)
- Operative Skills (new technology/process)
- Operative Skills (craft workers).

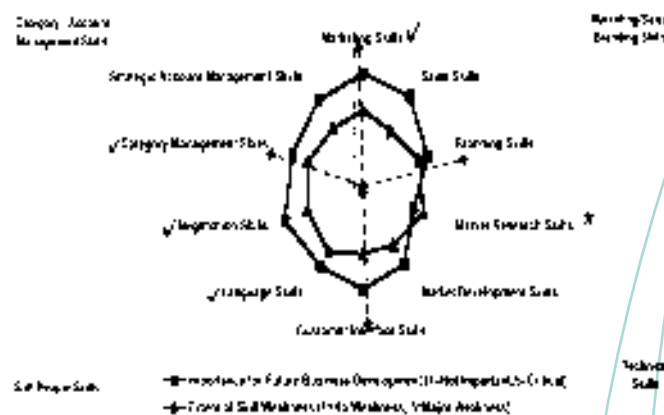
Productivity efficiency skills (skills related to production line efficiency), while not identified as a critical area of weakness by the industry survey, was highlighted as an area of significant skill weakness during company interviews and during the industry workshop.

Figure 4.10: Sales and Marketing Skills Important for Future Business Development



Source: PwC Survey Analysis.

Figure 4.11: Extent of Skill Weakness in Sales and Marketing



Source: PwC Survey Analysis.

Sub Category: Sales & Marketing Skills

(a) Skills important for future business development

In the area of sales and marketing, the survey informants indicated the following skills as important for future business development:

- Marketing Skills
- Sales Skills
- Customer Interface Skills
- Language Skills
- Negotiation Skills
- Category Management Skills.

(b) Extent of Skill Weakness

For this sub-category of skills, the majority of respondents identified the following skill sets areas of weakness for their companies:

- Branding Skills
- Language Skills
- Negotiation Skills
- Category Management Skills.

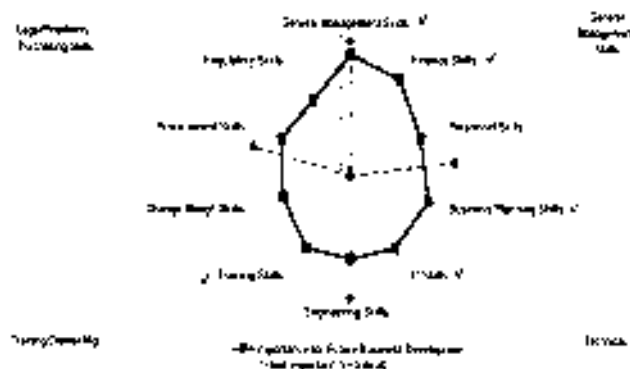
Market research skills, whilst identified as an area of weakness by the companies surveyed, were not considered by these companies as critical to their future business development. However, given the potential impact of the drivers-of-change as outlined earlier in this report, going forward it is likely that the requirement for market research skills will grow in importance.

(c) Critical Skills Gaps

Based on the above feedback it is possible to conclude that critical skill gaps exist in the following areas:

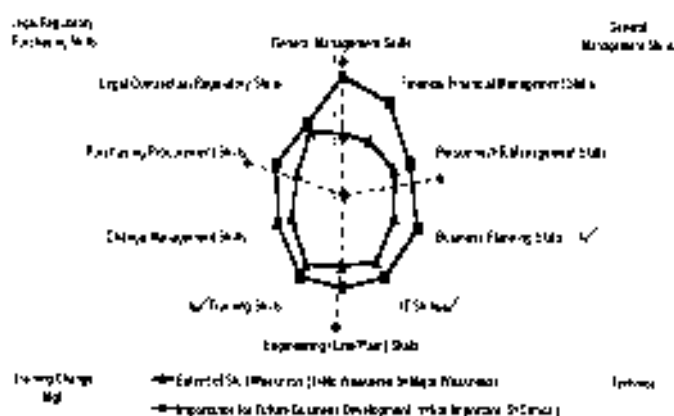
- Marketing Skills (marketing/sales skills 'dedicated' to the food industry)
- Language Skills
- Negotiation Skills
- Category Management Skills.

Figure 4.12: Support Skills Important for Future Business Development



Source: PwC Survey Analysis.

Figure 4.13: Extent of Skills Weakness in Support Skills



Source: PwC Survey Analysis.

Sub Category: Support Skills

(a) Skills important for future business development

In the area of sales and marketing, the survey informants indicated the following skills as important for future business development:

- General Management Skills
- Finance Skills
- Business Planning Skills
- IT Skills (particular those underpinning supply chain management and logistics processes)
- Training Skills.

(b) Extent of Skill Weakness

For this sub-category of skills, the majority of respondents identified the following skill sets areas of weakness for their companies:

- IT Skills (particular those underpinning supply chain management and logistics processes)
- Business Planning Skills

- Training Skills
- Personnel/HR Management Skills.

(c) *Critical Skills Gaps*

Based on the above feedback it is possible to conclude that critical skill gaps exist in the following areas:

- Business Planning Skills
- IT Skills (particular those underpinning supply chain management and logistics processes)
- Training Skills.

Summary

Employment levels in the food industry are expected to decline over the remainder of the current decade. Within this overall decline, fundamental changes are expected to occur in both the profile of employees entering the sector and the skill sets required by the industry.

The two areas where these changes are likely to be most apparent is in the skills profile of both unskilled labour and graduates. Competitive pressures and the difficulty in securing local labour are likely to contribute to an increased demand for immigrant labour. The skill set of graduates will evolve to reflect changes in the market environment and industry structure.

Analysis of survey respondents and the views expressed at the industry workshop confirmed the above trends. More specifically, the primary research identified both the key skills important for future business development and the strength and weakness of Irish food processors in these respective areas. A summary of the critical gaps identified in the analysis is presented below.

Figure 4.14: Summary of Critical Gaps Identified in the Food Processing Sector

SKILLS AREA	CRITICAL GAP
R&D/NPD/Quality Control Skills	<ol style="list-style-type: none"> 1. Skills needed to commercialise NPDs 2. Product Research/NPD Skills
Processing Skills	<ol style="list-style-type: none"> 1. Operative Skills (existing technology) 2. Operative Skills (new tech/process) 3. Production Supervisory Skills 4. Operative Skills (craft workers)
Sales and Marketing Skills	<ol style="list-style-type: none"> 1. Marketing Skills 2. Language Skills 3. Negotiation Skills 4. Category Management Skills 5. Product Research/NPD Skills
Support Skills	<ol style="list-style-type: none"> 1. Training Skills 2. IT Skills (particularly those underpinning supply chain management and logistics processes)

Source: PwC Survey Analysis.

5. Current Levels of Training and Constraining Factors

Overview of the Section

In this section of the report an outline of the relative importance of the various sub-sectors of the food processing industry in terms of their contribution to the Irish economy is presented. In addition, a detailed description of the various ‘drivers-of-change’ which will significantly impact/influence of the development of the food processing industry in Ireland is provided. The drivers-of-change which are considered in this section include:

- consumer trends;
- trade purchasing developments
- industry structure;
- agriculture and trade policy;
- food legislation;
- technology (including biotechnology); and the
- domestic economy.

5.1 Dedication to Training

The Irish food processing sector does not have a strong tradition of engaging in staff training. This observation is supported by a range of industry surveys over recent years, including the survey undertaken for this report which shows that the average number of days training undertaken by employees reached a level of only 1.28 days in 2001.

Whilst there are a number of factors which combine to explain to some extent this relatively low level of training, given the importance of the food processing industry to the national economy and the significant challenges that it is facing, this relatively low level of staff training would have to be regarded as a cause for concern.

When commenting on the propensity of Irish food processing companies to undertake training, it is not sufficient to concentrate solely on the level of training undertaken in terms of the number of days training per employee, but it is also necessary to consider the nature of this training. The types of training which food processing companies engage in fall into two broad categories, namely:

1. Basic or non-discretionary training; and
2. Strategic/innovative training.

The main features of the training completed under each of these headings are summarised on Figure 5.1 below. Basic training is undertaken by companies primarily in response to regulatory requirements and/or demands from buyers, notably retail buyers. This type of training tends to focus on ‘here-and-now’ company needs. Strategic or innovative training, by contrast, is undertaken by companies as a means of developing the business in line with, or in pursuit of, what they consider to be their desired medium/long-term strategic position. Consequently, it tends to be more future/developmental in focus.

The primary focus of training in the Irish food processing industry tends to revolve around responding to regulatory and/or buyer demands, i.e. basic or reactionary training. Apart from some notable exceptions, training of a strategic or innovative nature tends to occur less frequently. An analysis of training providers in Section 7 bears this out. This analysis concludes that the vast bulk of organisations providing training to Irish food processing companies are focused on providing training programmes/courses driven by regulatory/buyer requirements.

Figure 5.1: Characteristics of Training Activities Undertaken by Companies

TYPE OF TRAINING	CHARACTERISTICS OF TRAINING ACTIVITIES
<p>Basic</p>	<ul style="list-style-type: none"> • Resolves immediate problem/can be vital for company survival • Reacting to regulatory/keeping up with regulatory requirements • Responding to buyer demands • Potential for minimalist approach/only engaging in absolutely necessary training activities • Keeping company in business/element of investing in the present • Generally does not provide any basis for company differentiation
<p>Strategic/ Innovative</p>	<ul style="list-style-type: none"> • Can create platform for future development • Derived from/driven by companies medium/long-term strategic plan • Future focused: aims to improve company performance/prospects • Focus on company development/element of investing in the future • Significantly oriented towards customer/market development • Potential to provide basis for company differentiation • Has potential to assist in the area of staff retention/development

5.2 Constraints/Barriers to Training

The relatively low average level of training per employee in food processing companies can be partially explained through analysis of the barriers to training identified within this industry sector. These barriers fall into one of the following five categories:

1. Supply;
2. Demand;
3. Policy;
4. Company specific; and
5. Pan-Industry barriers.

5.2.1 Barriers to Training – Supply

Supply Barriers: Main Areas of Concern

The lack of availability of suitable courses of a recognisable quality, as implied by quality standard/accreditation process, is a significant supply related barrier to training.

Availability of suitable courses

The lack of ‘dedicated’ training programmes for the food processing industry in a number of areas related to sales and marketing was a cause of concern for food processing companies – this was a particular concern for the consumer foods processing sub-sector.

A number of companies surveyed for this report (32%), were of the view that a lack of suitable courses was a major constraint preventing them from undertaking training.

Quality/quality guarantee of training course

In the absence of a nationally recognised qualification/accreditation process for all training courses, the issues with respect to determining the quality of an individual training programme is a concern for food processing companies. In some instances this has proved to be a barrier to training.

Quality issues relate not only to course content but, according to the companies interviewed for this report, to training course providers.

Availability of training courses locally

Given the nature of food processing activity and in particular the constraints with respect to available time/labour (see later comments) the inability of companies to access certain courses in their locality can on occasion be a significant barrier to training – taking staff off-site for training can prove difficult for food processors, particularly the small-to-medium sized operators.

Lack of centralised information on training courses/providers

The lack of an easily accessible, comprehensive and current directory/database providing details of all training programmes and training providers can prove to be a barrier to training.

*5.2.2 Barriers to Training – Demand**Demand Barriers: Main Areas of Concern*

Costs, both indirect and direct, are the two most significant barriers to training identified by the food processing companies surveyed for this report with 68% and 60% of respondents respectively identifying these issues as ‘major’ barriers to training.

Included among the main demand-related barriers to training are the following issues.

Indirect cost

This was singled out as the most significant barrier to training for the Irish food processing industry with over 68% of all survey respondents identifying this issues as a ‘major’ barrier to training.

Indirect costs in this context relate to all of the costs associated with undertaking training, apart from the costs of the programme itself – notably, loss in output/downtime as a result of staff undertaking training courses/programmes.

Direct costs

The issue of direct costs was the second most significant barrier to training, with over 60% of all respondents identifying this as a ‘major’ barrier to training.

Direct costs in this context relate to the cost associated with undertaking a particular training programme, i.e. the course/programme fee and associated costs.

*5.2.3 Barriers to Training – Policy**Policy Barriers: Main Areas of Concern*

The criteria which applicants must meet in order to qualify for grant aid support for training is the most significant policy related barrier to training identified by food processing companies.

Included among the main policy related barriers to training are the following issues.

Criteria used for selection for/allocation of grant aid support

The criteria which companies must meet in order to be in a position to qualify for training-related grant-aid can on occasion prove to be an impediment to engaging in training.

In particular, food processors are of the view that linking grant aid qualifying criteria to an increase in employment levels or output growth (as measured by increased sales/exports) is not conducive to achieving a significant uplift in the level of training.

Process of grant-aid application

The process which potential applicants must follow to apply for grant-aid assistance towards training can on occasion prove to be excessively bureaucratic resulting in companies electing not to pursue this source of training support.

Confusion with respect to the role of the various state agencies

Whilst not a major barrier to training per se, the fact that considerable confusion exists among companies in understanding the precise role of the various state agencies in the area of training/support for training is not conducive to encouraging an uplift in training activity.

Immigrant workers – language barrier

In recent years immigrant workers have become a significant source of labour for the Irish food processing industry. However, for this group of workers, language barriers and in particular the short-term nature of their work contracts can act as a barrier to training for this particular group of employees.

Literacy/numeracy skills

Within the food processing sector, particularly at an operative level, there are a significant number of employees who lack any formal qualifications and for whom poor literacy/numeracy skills create a barrier to engaging in formalised training.

5.2.4 Barriers to Training – Company Specific

Company-Specific Barriers: Main Areas of Concern

Disturbance to business; staff retention difficulties, a lack of demand for training on the part of employees coupled with a lack of understanding/appreciation of training at management level are among the main company-specific training barriers.

The following company-specific issues can act as barriers to training in the food processing sector.

Disturbance to business

The disturbance to business caused by employees undertaking training was cited as a major barrier to training by some 68% of the companies who responded to the industry survey. It is particularly significant for the small-to-medium sized operators who lack the resources to cover for staff whilst they are undergoing training related activities or where there are management or production level activities that can not easily be allocated to other staff within the organisation.

Staff retention – post training

A significant minority of food processing companies (43%), indicated that difficulties/concerns around their ability to retain staff/increased staff mobility following training programmes was a major barrier to training. Companies were of the view that the potential benefits of training did not outweigh the risk of losing staff to a competing company following the completion of training courses/programmes.

Management understanding of the role of training

A lack of understanding/appreciation at management level of the role of training in the development of the company can act as a barrier preventing companies from committing time/resources to staff training.

While management are conscious of a range of challenges facing their business going forward, particularly those of an immediate nature, for the most part the role that staff training might play in addressing these challenges is not a priority at management level within the food processing industry.

Lack of demand from employees

According to employers surveyed it would appear that in general, at employee level, there is not a significant demand/pressure put on food processing companies to engage in training related activities. This may be explained by factors such as:

- the absence of a training culture within this sector;
- the relatively high level of non/semi-skilled employees – particularly at operative level;
- the relatively high level of staff turnover in certain sub-sectors of the industry (see pan-industry constraints);
- in most instances, the lack of a formal qualification/award on completion of the training programmes coupled with the lack of a qualifications framework which would allow employees build on training programmes with the aim of achieving a recognised qualification; and
- in some instances, the transient/short-term nature of employment in the sector – particularly for immigrant workers;
- also in some instances, the lack of encouragement on the part of employers and the lack of a formalised channel through which such requests for training can be made.

Figure 5.2: Impact of Barriers to Training

		Obstacles to Training		
		High	Medium	Low
Demand	Barrier to Training			
	Availability of suitable courses		✓	
	Quality guarantee of course		✓	
	Availability of training locally			✓
Supply	Indirect costs	✓		
	Direct costs	✓		
Policy	Grant aid allocation criteria	✓		
	Grant aid application process		✓	
	Confusion with respect to role of relevant state agencies			✓
	Immigrant workers – language barriers			✓
	Poor literacy/numeracy skills			✓
Company Specific	Disturbance to business	✓		
	Staff retention – post training		✓	
	Management understanding of the role of training	✓		
	Demand for training not prompted by employees			✓

Source: PwC industry survey & interviews with cross section of food processing companies.

5.2.5 Barriers to Training – Pan Industry Constraints

Pan-Industry Constraints/Barriers: Main Areas of Concern

The seasonal nature of production, the commodity focus of large parts of the Irish food processing sector along with the short-term planning horizon prevailing are among the main pan-industry constraints/barriers to training.

In addition to the barriers to training outlined on the previous pages, there are a number of pan-industry constraints which combine to prevent/inhibit training within the food processing industry.

Seasonal nature of production

Seasonality of production is a major feature of the Irish food processing industry. This is particularly the case for the dairy and meat processing sub-sectors – two of the most significant industry sub-sectors both in terms of output and employment.

Whilst seasonality of output has significant and well documented implications on the product and market potential of the Irish food processing industry, this industry feature can also act as a major constraint, impacting on the ability and willingness of companies to engage in training.

The seasonal nature of output results in a significant demand for labour/management input during certain times of the year when output reaches its peak and a corresponding decline in labour/management input requirements when production levels fall back – with substantial peak-to-trough ratios evident in production.

Seasonality of production, therefore, can act as a constraint impeding the ability and willingness of companies to undertake training both due to the unavailability of management/staff for significant period of the year when production levels reach a peak and, particularly in the case of operative workers, the fact that significant numbers of employees will not be employed during the period when output levels are low.

Commodity nature of output

Whilst the Irish food processing industry has made significant and successful efforts to increase the value of its output, a persistent and key feature of the industry is its significant dependency on commodity products/markets.

Commodity food products, be they milk powders, butter or meat, tend to be traded across a range of markets, both within and outside the EU, with market performance based almost entirely on price and with little scope for product/service differentiation. Processors operating in this market space tend to operate between the buy/sell margins – often relying on the CAP support framework to underpin markets in times of oversupply.

This feature of the Irish food processing industry is not one which encourages significant investment in training – particularly of a strategic/innovative nature. For the most part commodity producers tend to only be interested in training to meet current regulatory/trade requirements.

Due to a range of pressures that the industry is likely to face (Section 2: Drivers-of-Change) the expectation is that there will be a concerted effort to move away from the commodity focus which has prevailed to date. However, such a move is likely to be gradual so the commodity nature of production is likely to remain as a pan-industry constraint on training for the foreseeable future.

Short-term operational focus

For the most part, the Irish food processing industry tends to operate to a short-term operational horizon. This feature of the industry is due to a number of factors, including:

- the commodity nature of the output in a number of food processing sub-sectors;
- the industry ownership structure;
- the strength of the primary producer lobby;
- the relatively small scale of operations;
- the relatively low levels of profitability; and
- the policy driven market support framework.

This observation is supported by the results of the industry survey undertaken for this report. The feedback received on the major drivers-of-change showed a strong bias towards short-term issues. More long-term drivers, whilst having the potential to be ‘industry shaping/disruptive’ in their impact, received correspondingly less industry comment/concern.

Short-term issues, and in particular the concern around short-term profitability, often become an all-consuming concern for the food processing sector, leaving little or no time for management to consider their long-term development plans and in particular how such plans should be supported by an employee training plan/framework.

Weakness in the area of strategic planning

Apart from some notable exceptions, which would include the large internationally focused players, strategic planning would not be regarded as a particular strength of the Irish food processing industry. Consequently there is not a solid basis for approaching employee training/development in an organised/planned fashion. An ad-hoc/reactionary approach to training, often responding to external stimuli such as regulatory requirements/buyer demands, while failing to develop long-term well-grounded training plans, is the norm.

High staff turnover

High staff turnover, particularly at operative level, is a feature of operations, particularly but not exclusively in the case in the meat processing sector. This issue has become more acute in recent years, as employment opportunities in other sectors of the economy have grown. High staff turnover levels act as a disincentive to investment in employee training programmes – particularly of a long-term developmental nature.

Regional location

Given the requirement of processors to be located close to the raw material supply base, food processing companies tend to be dispersed throughout the country – often located away from major population centres. Their location in regional settings, particularly for SMEs, is not conducive to gaining access to training courses/programmes – often resulting in companies having to incur additional costs/disturbance to business when such training is undertaken.

Shift workers

Shift working, primarily at an operative level, is a major feature of the food processing industry – particularly for consumer food processing companies or during peak production times for companies with a highly seasonal production pattern. Whilst shift working is a necessary requirement for the operations in a number of the food processing sub-sectors, it can prove to be a significant obstacle/problem in terms of planning staff training programmes.

Large number of small scale operators

Within the food processing sector, while there are a number of large scale internationally focused players there are also a significant number of small scale food companies for whom resource constraints (particularly time and financial constraints) can prove to be major obstacles preventing them from engaging in all but regulatory/buyer-demanded training activities – indeed some of these players find it extremely difficult even to meet these basic training requirements. It should be noted that 95% of Irish food processing companies are classified as SMEs employing less than 250 employees (Section 2).

Figure 5.3: Pan-Industry Constraints on Training

Constraint/Barrier to Training	Obstacle to Training		
	High	Medium	Low
Seasonal nature of production		✓	
Commodity nature of output	✓		
Regional location		✓	
Shift workers		✓	
Large number of SMEs		✓	
Short-term operational focus	✓		
Weakness in the area of strategic planning	✓		
Strategic plans not including/prioritising training plans	✓		

Source: PwC industry survey & interviews with cross section of food processing companies.

5.3 Conclusions

To date, the Irish food processing industry as a whole has not developed a strong culture of training. Much of the training effort has been concentrated around responding to regulatory requirements and/or resolving short-term issues. Strategic planning is not a key characteristic of the food processing industry. Even where planning is undertaken, training plans/frameworks do not feature strongly as an integral part.

Within the food processing industry there are significant barriers to training which are either related to the current process used to deliver/support training or are inherent in the structure, operations and culture of the industry.

The inevitable impact of the drivers-of-change will be a shift away from commodity production towards more value-added/consumer focused products/markets for a significant proportion of the food processing industry. For those who remain focused on commodity products/markets, scale and efficiency will determine long-term success. Such developments within the industry will need to be matched by a measured emphasis on training/up-skilling – specifically focused on addressing the key areas of weakness identified in Section 4 of this report.

6. The Provision of Educational Courses for the Food Processing Sector

Overview of the Section

In this section, the leading third level courses related to the food-processing sector are profiled. Postgraduate courses are also included in order to get a complete picture of the educational opportunities available for those who wish to pursue a career in the sector.

The following are the key elements of this section:

- Profile of the main food-related undergraduate courses provided by Irish colleges
- Profile of the main food-related postgraduate courses provided by Irish colleges
- Assessment of student demand for such courses, as expressed via preferences in CAO applications
- Examination of graduate entry numbers into the food processing sector
- Consideration of both curricula gaps and overlaps.

6.1 Undergraduate Courses

The main third level courses that relate to the food-processing sector have been identified and are provided in Table 6.1 below. This also includes the numbers of graduates for each course shown. It is clear that there is a broad range of undergraduate courses available and that students have the opportunity to study across the full spectrum of the food-processing sector.

Table 6.1: Main Third Level Colleges Providing Food-Related Undergraduate Courses

College	Course	Qualification	Duration	Work Placement	Number of Graduates		
					1999	2000	2001
NUI, Cork	Food Technology	BSc	4yrs	•	29	31	32
	Food Business	BSc	4yrs	•	35	37	34
	Nutritional Science	BSc	4yrs	•	27	23	39
	Food Science	BSc	4yrs	•	38	35	34
NUI, Dublin	Agricultural and Food Engineering	BEng	4yrs		19	15	10
	Engineering Technology	BAgrSc	4yrs		11	18	8
	Agricultural Science	BAgrSc	4yrs		176	199	197
	Food Science	BAgrSc	4yrs		16	5	12
NUI, Galway	Marine Science	BSc	4yrs		14	14	11
	Biotechnology	BSc	4yrs		18	18	19
NUI, Maynooth	Biotechnology	BSc	4yrs		0	11	17
DCU	Biotechnology	BSc	4yrs		48	48	58
University of Limerick	Food Technology	BSc	4yrs		24	19	24
DIT Kevin Street	Applied Science	Diploma	3yrs		N/A	82	57
	Applied Science (Technology)	BSc	4yrs		N/A	67	83
	Applied Science (Physics)	BSc	4yrs		N/A	16	13
Sligo IT	Food Science	Cert	2yrs		8	N/A	N/A
DIT Cathal Brugha Street	Food Technology	BSc	4yrs		N/A	14	11
Waterford IT	Agricultural Science	Cert	2yrs		23	21	25
	Horticulture	Diploma	3yrs	•	N/C		
IT Blanchardstown	Horticulture	Diploma	3yrs	•	N/C		
Galway/Mayo IT	Aquaculture	Cert	2yrs		8	9	9
Letterkenny IT	Food Science	Diploma	3yrs	•	13	15	5
Dundalk IT	Food Science	Cert	2yrs		9	17	10
	Food Science	BSc	4yrs	•	12	13	8
	Agriculture	BAgr	4yrs		26	20	5
Queens University, Belfast*	Agricultural Technology	BSc	4yrs	•	N/C	N/C	11
	Food Technology Management	BSc	4yrs		0	0	1
	Microbiology	BSc	4yrs		0	1	0
	Agricultural Science	BSc/BAgr	4yrs	•	6	2	2
Loughry College	Food Technology	BSc	4yrs	•	12	24	24
	Supply Management (Food)	BSc	4yrs	•	N/C		
	Food Technology	Higher Nat. Dip.	3yrs	•	21	6	16
	Supply Management (Food)	Higher Nat. Dip.	3yrs	•	20	16	23
	Food Technology and Innovation	Nat. Dip.	2yrs	•	17	43	25

* Third Level Programmes in Queens are run on a modular basis enabling students to choose various components of different courses.

N/C = New Course. N/A = Not Available.

Note: A number of the courses provided by the Institutes of Technology, as listed in the above table, allow for progression on to diploma and/or degree level qualifications. Candidates who opt to pursue such an option will not be available for employment in the year of graduation from their initial course choice.

Numbers of Graduates

In terms of numbers of graduates potentially available for the food industry, these courses supply between 500-600 graduates annually (the exact number depending on the number of graduates going onto further studies). However, it should be noted that:

- Not all of these graduates seek employment in the food sector.
- The supply of graduates to the food industry is not limited to such agri/food courses. It is recognised that graduates from traditional business courses such as Business Studies/Commerce/Marketing are available to work in the food industry. Equally, general Engineering and Science graduates are also available to the food sector.
- Some students from the Republic of Ireland choose to attend Queen's University and Loughry College in Northern Ireland, but subsequently return to work in the South. However, it is believed that very small numbers of students are involved.

Republic of Ireland Universities

Below we briefly profile the main area of specialism or focus of the different colleges. More detailed profiles of each course are contained in Appendix 5.1.

National University of Ireland, Cork

- One of Ireland's leading Food Science Universities and it also offers a course in Food Business. Courses provide a mix of theory, projects and work experience.

National University of Ireland, Dublin

- Ireland's leading agricultural science faculty coupled with courses in engineering and food science give the College the ability to produce academically strong graduates for the food-processing sector.

National University of Ireland, Galway

- Galway is the leading college in the country for Marine Science with its Martin Ryan Marine Science Institute. A course in Biotechnology is also provided.

National University of Ireland, Maynooth

- Maynooth offers a relatively new course in Biotechnology, a course that is heavily based in scientific theory coupled with practical laboratory sessions. The course also allows students to take courses in the business and commercial aspects of biotechnology.

Dublin City University

- Its Faculty of Science provides a degree course in Biotechnology. This is a general course which allows the student to specialise in food options.

University of Limerick

- A specialised Food Technology course is offered. The student has the opportunity to combine scientific theory with management and language options.

Institutes of Technology

Dublin Institute of Technology

- Cathal Brugha St. and Kevin St. offer Food Technology and Applied Science courses respectively. Both faculties offer a mixture of applied work and theoretical application combined with options in foreign languages and business studies.

Institute of Technology, Waterford

- Waterford IT has a Faculty of Agriculture and offers a Certificate and Diploma in Agricultural Science and Horticulture respectively. Combined with scientific theory, both courses are practically-based and involve work placements.

Institute of Technology, Blanchardstown

- Horticulture is offered as a three-year diploma. The course focuses on preparing the student for both the management and scientific sides of horticulture, and includes projects and work placement.

Institute of Technology, Galway/Mayo

- A multi-skilled Aquaculture course is run providing the graduate with not only aquatic science skills but also the management tools necessary to manage a successful fish farm or fisheries business.

Institute of Technology, Letterkenny

- Food Science diploma that provides the graduate with the basic skills needed to enable entry into the food processing sector at technician level, or allow the graduate to go on to further study.

Institute of Technology, Dundalk

- Dundalk IT offers a certificate in Food Science which trains graduates in the basic skill requirements to enter the food industry. They also have the option to continue to study to a higher level.

Industry/Work Placements

According to employers, work placements are an important developmental element for graduates. Experience gained in working environments complements the academic and technical training received in Third Level colleges. In this regard, the agri-food courses available are well structured, with high levels of industry placements and applied, practical projects. Furthermore, IBEC's postgraduate European Orientation Programme (EOP) provides a one year work placement for a relatively small number of graduates in food companies annually.

Table 6.2: Key Elements of Undergraduate Programmes

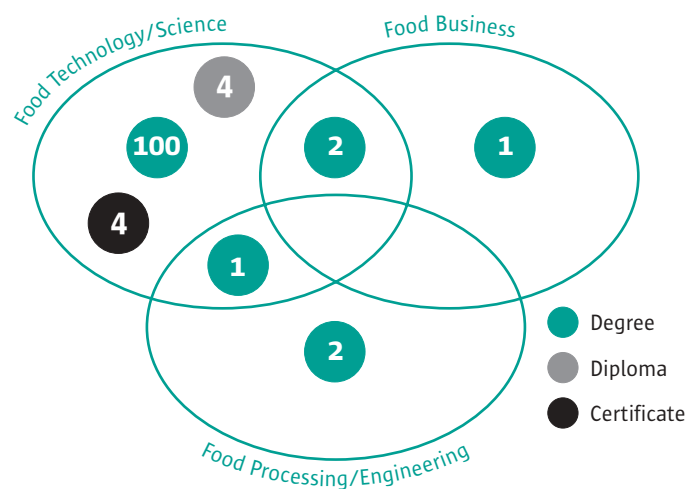
Course	Applied Project	Overseas Study	Work Placement
Food Technology, UCC	✓		✓
Food Business, UCC	✓		✓
Nutritional Science, UCC	✓		✓
Food Science, UCC	✓		✓
Agriculture & Food Engineering, UCD	✓	✓	
Engineering Technology, UCD	✓		✓
Agricultural Science, UCD	✓		✓
Food Science, UCD	✓		✓
Marine Science, UCG	✓	✓	
Biotechnology, UCG	✓		
Biotechnology, Maynooth	✓		✓
Biotechnology, DCU	✓		✓
Food Technology, UL	✓		✓
Applied Science, Kevin St.	✓	✓	
Food Technology, Cathal Brugha	✓		✓
Food Science, IT Sligo			
Agricultural Science, IT Waterford			
Horticulture, IT Waterford	✓		✓
Horticulture, IT Blanchardstown	✓		✓
Aquaculture, GMIT			
Food Science, IT Letterkenny	✓		✓
Food Science, IT Dundalk			

6.2 Observations on the Provision of Undergraduate Courses

The 15 main degree courses identified, together with the four Certificate and four Diploma courses provided by colleges in the Republic of Ireland, can be categorised into three broad areas of study, namely:

- Food Technology/Science
- Food Business
- Food Processing/Engineering.

Figure 6.1: Curriculum Focus of Food-Related Undergraduate Programmes



The dominance of food science and technology courses in the provision of agri/food education is clear from Figure 6.1 above. All four Certificate courses, all four Diploma courses and 10 of the 15 degree programmes are positioned exclusively in this sphere of education. It is also noteworthy that there are no “generalist” courses that encompass all three educational spheres.

A key consideration is whether this educational balance is now appropriate to the anticipated future needs of the food industry.

6.3 Postgraduate Study

There is a wide range of postgraduate opportunities in the food-related area. Postgraduate studies allow the graduate to pursue specialised interest in the area of their choice. Table 6.3 below lists the key postgraduate courses, while Appendix 5.1 profiles each of the courses in more detail.

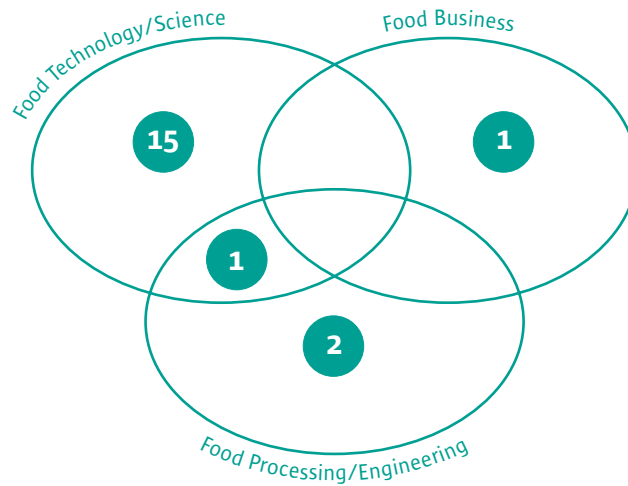
Table 6.3: Postgraduate Programmes

College	Course	Qualification	Duration	Dissertation/ Project	Work Experience	Number of Grads 2001
NUI, Cork	Applied Science (Biotechnology)	Hdip/MSc	1/2yrs	•	•	2
	Applied Science (Aquaculture)	Hdip/MSc	1yr	•		3
	Applied Science (Fisheries Management, Development and Conservation)	Hdip/MSc	1yr	•		7
	Food Science and Technology (Food Science)	Hdip	1yr	•	•	15
	Food Science and Technology (Food Chemistry)	MSc	2yrs	•	•	4
	Food Science and Technology (Nutritional Science)	HDip	1yr (f/t) 2yr (p/t)	•	•	9
	Food Business	MSc	2yrs	•		10
NUI, Dublin	Food Engineering (Master of Engineering Science)	MEngSc	1yr	•		4
	Engineering Technology (Master of Agricultural Science)	MSc(Agr)/ MAgrSc	1yr	•		5
	Plant Protection (Master of Agricultural Science)	MSc(Agr)/ MAgrSc	1yr	•		1
	Food Science (Master of Agricultural Science)	MSc(Agr)/ MAgrSc	1yr	•		8
NUI, Galway	Biotechnology	MSc	1yr	•	•	8
DCU	Biological Sciences	Grad Dip/ MSc	1yr	•		9
	Biotechnology		2yr(p/t)			16
QUB	Food Science	MSc/ Grad Diploma	1yr	•		
	Food Safety Management	MSc/ Grad Diploma	2/5yr (p/t)	•		
University of Ulster	Food Biotechnology	Grad Dip/MSc	1yr			
	Biotechnology	Grad Dip/MSc	1yr			

These postgraduate programmes also fall into three broad areas of study:

1. Food Technology/Science
2. Food Business
3. Food Processing/Engineering.

Figure 6.2: Curriculum Focus of Main Food-Related Postgraduate Programmes



A similar pattern emerges as that pertaining in the undergraduate courses, with a heavy orientation towards food science and technology. It is also recognised that individual lecturers and departments are also supervising research Masters, thereby adding to the availability of specialised skills.

Over the medium term, consideration as to whether this is the most appropriate educational balance for the food sector is required.

6.4 Applicant Preferences

In order to assess the demand for food-related courses, student demand, as expressed via preferences on the CAO application, is examined. Table 6.4 presents student preferences over the 1999-2002 period.

Table 6.4: Student Preferences for Food-Related Courses*

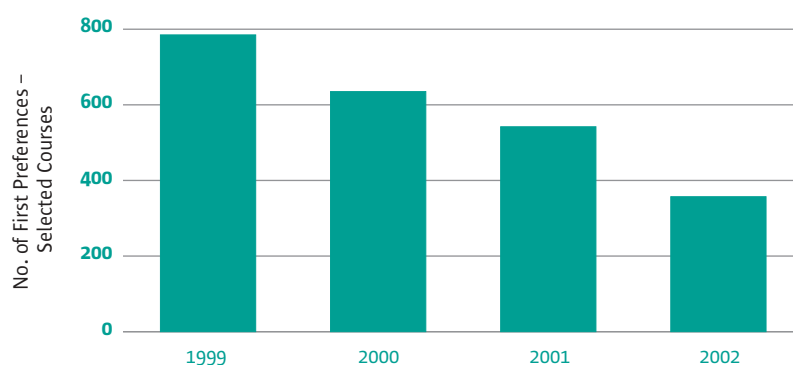
College	Course	Course Code	First Choice				Second Choice				Third Choice			
			1999	2000	2001	2002	1999	2000	2001	2002	1999	2000	2001	2002
NUI, Cork	Food Technology	CK503	36	23	35	0	69	63	68	0	102	79	80	0
	Food Business	CK501	53	49	39	65	53	67	65	90	102	68	74	106
	Nutritional Science	CK504	83	65	68	78	97	73	84	107	88	84	79	105
	Food Science	CK502	54	42	56	0	129	104	95	0	117	106	104	0
NUI, Dublin	Agricultural and Food Engineering	DN070	0	0	9	6	0	0	17	12	0	0	24	11
	Engineering Technology	DN047	0	0	0	12	0	0	0	30	0	0	0	19
	Agricultural Science	DN010	457	346	275	174	182	161	174	159	153	135	38	110
	Food Science	DN040	0	29	26	33	0	51	51	44	0	69	71	75
NUI, Galway	Marine Science	GY310	98	75	70	69	59	55	65	50	70	59	64	63
	Biotechnology	GY304	31	35	31	32	45	57	48	50	60	60	53	42
NUI, Maynooth	Biotechnology	MH202	44	26	24	17	54	47	39	49	49	49	56	41
DCU	Biotechnology	DC181	83	77	51	63	98	67	76	69	123	109	97	69
University of Limerick	Food Technology	LM068	35	36	33	20	43	55	39	35	59	67	53	50
DIT Kevin Street	Applied Science	DT273	522	404	466	390	562	459	382	350	362	303	270	276
Sligo IT	Food Science	SG401	48	37	0	44	79	62	0	60	80	62	0	80
DIT Cathal Brugha Street	Food Technology	FT480	0	0	23	37	0	0	35	56	0	0	47	63
Waterford IT	Agricultural Science	WD009	245	209	139	116	116	81	76	83	74	83	76	53
	Horticulture	WD096	0	0	56	61	0	0	42	48	0	0	51	89
IT Blanchardstown	Horticulture	BN007	0	0	61	78	0	0	79	108	0	0	42	38
Galway/Mayo IT	Aquaculture	GA030/ GA730	37	33	35	28	40	30	29	23	43	36	35	34
Letterkenny IT	Food Science	LY017	21	24	24	30	41	43	44	33	50	38	44	40
Dundalk IT	Food Science	DK050	38	28	37	42	58	47	59	65	63	71	57	61

* "0" Means course was not offered.

Student first preferences for these courses has generally declined since 1999. However, this must be seen in the context of the overall decline in the numbers of students sitting the Leaving Cert. This has fallen from 62,800 in 1999 to 55,400 in 2002, a drop of 12 per cent. Furthermore, there has been a dramatic increase in the number and choice of Third Level courses and places available. Department of Education and Science statistics which show that there were 64,000 such places in 1990 but over 116,000 places by 2000.

Apart from the factors outlined above, the rapid decline in first preferences for agri/food courses is a cause for concern in the food industry. When preferences are examined for eight leading Third level courses, this downward trend is more clearly apparent.

Figure 6.3: CAO Applicant First Preferences: 1999-2002



This development possibly reflects the poor image of the food processing industry and its difficulties in competing with more glamorous, higher profile sectors, such as IT and science/technology, for graduates. It has been exacerbated as the economy has moved nearer full employment. Over the long run, it may have negative implications for the calibre of graduates available to the sector.

Trends in entry points

In line with the decline in first preferences, entry points levels have also fallen. This applies to virtually all courses. The combination of fewer Leaving Cert students and a greater availability of college places also plays a role in these trends in entry points.

Table 6.5 shows the points changes over the period 1999-2002 for each of the courses individually.

Table 6.5: Entry Points for Various Courses

College	Course	Points			
		1999	2000	2001	2002
NUI, Cork	Food Technology	355	270	345	345
	Food Business	395*	365*	335	360
	Nutritional Science	445	420*	390	425
	Food Science	395	370	345	345
NUI, Dublin	Agricultural and Food Engineering	375	370	335	335
	Engineering Technology	N/C	N/C	365	350
	Agricultural Science	355	340	320	340
	Food Science	N/C	370	360	360
NUI, Galway	Marine Science	365	360	340	360*
	Biotechnology	475	460	435*	420*
NUI, Maynooth	Biotechnology	365	330	330	330
DCU	Biotechnology	365	320	310	330
University of Limerick	Food Technology	340	335	330	310
DIT Kevin Street	Applied Science	200	200	AQA	255
Sligo IT	Food Science	AQA	AQA	125	125
DIT Cathal Brugha Street	Food Technology	200	200	200	260
Waterford IT	Agricultural Science	320	290	240	240
	Horticulture	N/C	N/C	245	220
IT Blanchardstown	Horticulture	N/C	N/C	255	250
Galway/Mayo IT	Aquaculture	AQA	205	155	180
Letterkenny IT	Food Science	AQA	AQA	155	120
Dundalk IT	Food Science	105	AQA	AQA	110

* Not all on this points scored were offered places.

AQA – All qualified applicants. N/C – New Course.

6.5 Graduate Entry into the Food Processing Industry

Based on an analysis of the HEA report “First Destination of Award Recipients in Higher Education (2000)”, the following summary data regarding the Food, Drink and Tobacco sector has been abstracted. For clarity, the situation in regard to overall graduate intake and that pertaining to dedicated food-related programmes are considered separately.

Total graduate intake, 2000

While some third level programmes are dedicated to qualifying graduates for employment in the food industry (e.g. the various food science and technology programmes) other programmes considered in this report (e.g. biotechnology, applied science, etc.) do not have a dedicated focus on the food industry although a number of graduates from these disciplines are employed in the food industry each year.

According to the industry survey undertaken by the HEA concerning the first employment destination of graduates in 2000, (as set out in Figure 6.4) a total of 280 recipients of higher education awards *from across all disciplines* entered the food, drink and tobacco sector in 2000.² Some 96 of these held certs or diplomas with a further 170 (60%) of them having degrees. The balance (approx 6%) held postgraduate qualifications.

Table 6.1 sets out those third level courses that have food/food related aspects to their curricula. Approximately 600 students per year graduate from these courses. However, the options open to these graduates are wider than the food 'processing' sector, with some opting to work in industry sectors such as life sciences, pharmaceuticals, agri-food research institutions and service sectors related to the food industry³.

Dedicated food related graduate intake, 2000 (Degree/Higher Degree)

In context of this study, the third level degree programmes that would be considered 'dedicated' to the food industry include the Food Science and Technology, Food Business and the Agricultural Science (including Agriculture Engineering) programmes. A total of 406 students graduate from these food industry 'dedicated' degree programmes in the Republic of Ireland during 2000 (see Table 6.1). A complete breakdown of the first destination employment for all of these programmes is not available.

According to the HEA survey of First Destination of Award Recipients, during 2000 a total of 189 survey respondents who graduated from Agricultural Science and Food Science and Technology degree programmes (which in the context of this report are considered food industry 'dedicated' programmes) took up employment in Ireland. Of those 189 students, a total of 40 indicated that they took up employment in the food industry.

In the case of Food Science and Technology, during 2000 almost 40% of the survey respondents who graduated with a degree/higher degree indicated that they took up employment in the food processing sector. The remaining graduates from this discipline were employed across a range of industry sectors with the financial services, retail distribution and the pharmaceutical sectors featuring strongly as employers of Food Science and Technology graduates (see Table 6.7).

With respect to the Agricultural Science degree programme, according to the HEA survey, uptake of employment in the food processing industry accounted for some 15% of graduates from this discipline. While this degree programme has a dedicated focus on the food industry, given its broad based curriculum (see Appendix 5.1) graduates from this programme tend to secure employment across a wide range of food industry related areas of work. A significant number of graduates from this degree programme are employed each year in the professional services sector (particularly in relation to providing consultancy services with respect to EU agricultural support schemes) and non-commercial state sponsored bodies (see Table 6.7).

Food related graduate intake, 2000 (Certs/diplomas)

As indicated earlier, 96 third level graduates (who responded to the HEA survey) qualifying with either a diploma or a certificate responded that they were employed in the food processing industry during 2000. However, as the data provided by the HEA does not provide a detail breakdown of the individual courses completed by these graduates, it is not possible to provide any comment with respect to the uptake of employment in the food processing industry by graduates from individual diploma/certificate courses.

² The HEA surveyed 35,510 graduates across third level institutions and achieved a response rate of approximately 61%.

³ Graduates taking up employment outside of sectors which would not be considered as a core focus of their respective third level programmes is a feature of graduate employment which is not unique to food-related degree programmes.

Table 6.7: First Destination Employment – Selected Degree Programmes, 2000

Employment by Sector	Food Science & Technology	Agriculture Science
Degree/Higher Degree Qualification	Percent of Total Graduates	
Agriculture, Forestry, Fisheries		
Agriculture, Forestry, Fisheries	4%	6%
Manufacture And Other Non-Service Industries		
Food Processing, Beverages, Tobacco	39%	15%
Construction & Civil Engineering	2%	2%
Pharmaceutical and Health Care	8%	1%
Public Services		
Local Government		13%
Health Boards & Hospital Services	2%	
Education	2%	4%
Non-commercial State Sponsored	2%	13%
Private Services		
Wholesale Distribution	2%	4%
Retail Distribution	8%	2%
Transport, Communication & Storage	6%	
Financial Services	10%	8%
Professional Services – Private Practice	2%	15%
Others/Unknown	13%	17%
Total	100	100

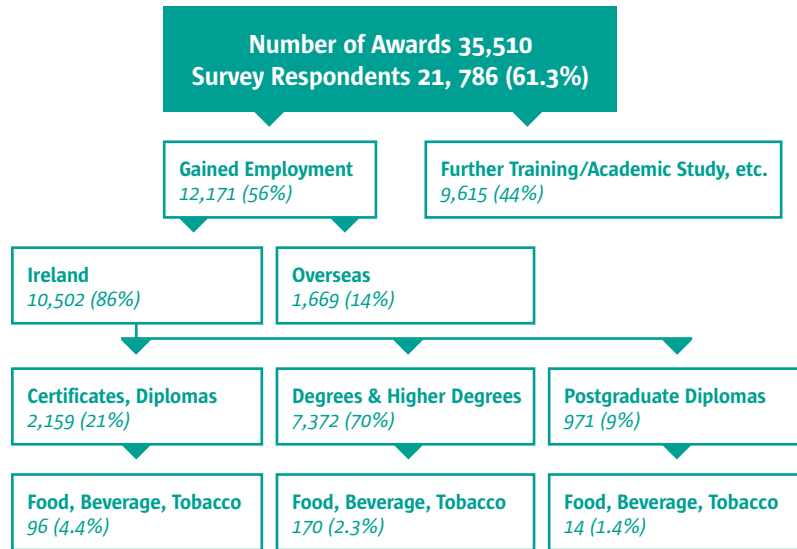
Source: HEA.

Numbers of graduates required by the food processing industry

It was not possible to quantify the total number of graduates that the food processing industry will require over the next five years (see Section 6). However, given the significant challenges that the industry is facing (as described in Section 2) strong management and commercial/technical skills will be required going forward – typically employees with such skill sets have a third level qualification. Therefore the industry needs to increase its intake of third level graduates in order to build its management capabilities for the future. Given the wide range of career options available to graduates undertaking food related degree programmes the food processing industry will need to make a concerted effort to attract high calibre graduates by offering them attractive career opportunities and prospects.

In conclusion, there is no evidence to suggest that the number of places on the food related third level courses (as presented on Table 6.1) needs to be increased or decreased – instead it is the industry’s ability to attract such graduates that needs to be enhanced.

Figure 6.4: Summary Analysis of First Destination of Higher Education Award Recipients in 2000*



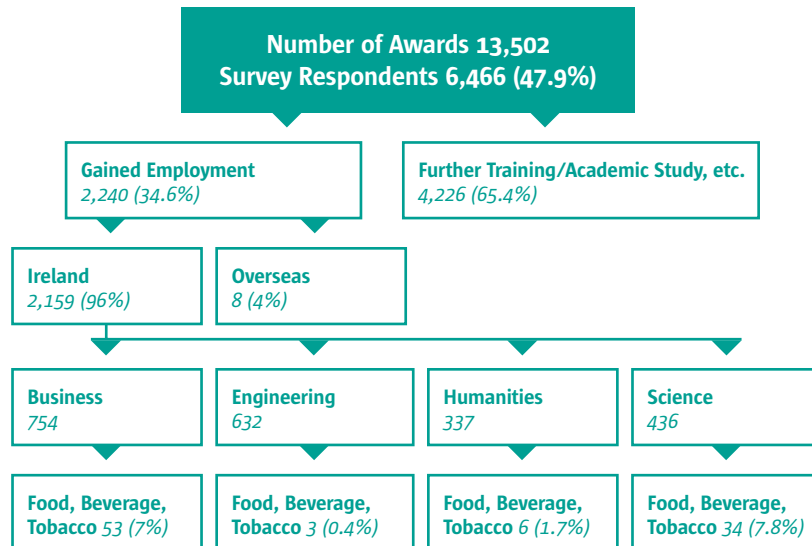
* Based on number of respondents.

Food, Drink & Tobacco Sector (FDT).

Total Third Level Graduates Entering = 280 (2.7%).

Further analysis of the 96 students with Certificates and Diplomas entering the food industry is outlined in Figure 6.5 below.

Figure 6.5: Analysis of First Destination of Certificate and Diploma recipients in 2000*



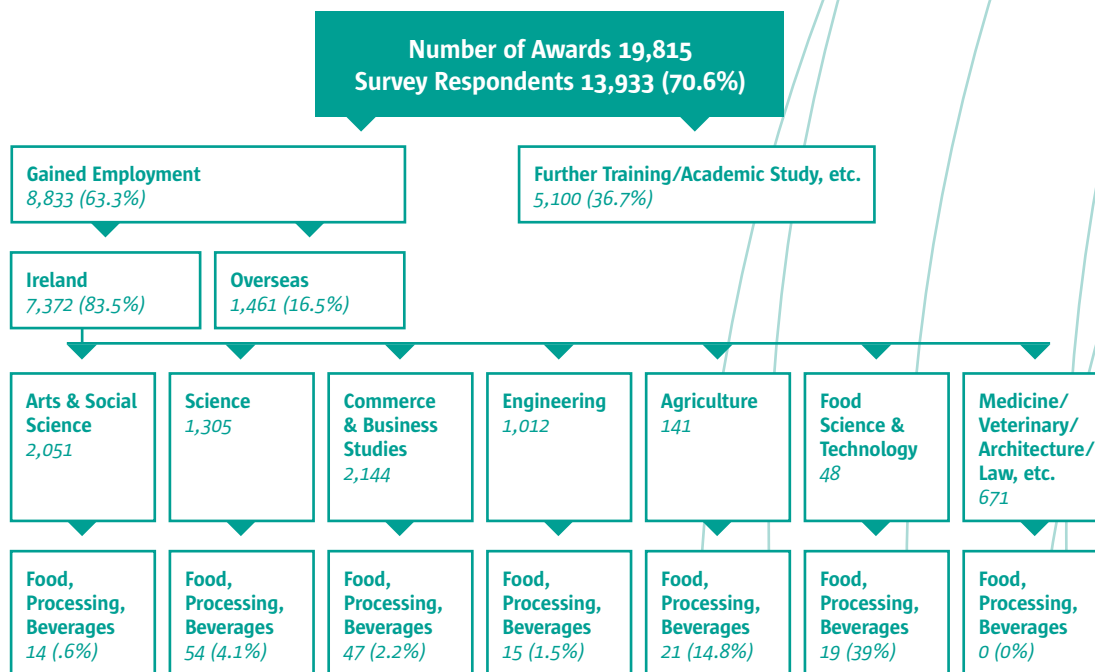
* Based on number of respondents.

Food, Drink & Tobacco Sector (FDT).

Total Sub Degree Entering = 96 (4.4%).

Further analysis of 170 Degree recipients entering the food industry is outlined in Figure 6.6 below.

Figure 6.6: Analysis of First Destination of Primary & Higher Degree Recipients in 2000*



* Based on number of respondents.

Total Primary & Higher Degrees entering Food, Drink, Tobacco Sector = 170 (2.3%).

6.6 Curricula Gaps

In the course of this study, a number of educational gaps were identified.

- The level of technical knowledge of the food technology/science graduates was acknowledged as a key strength by employers and industry. However, their inter-personal, team working and leadership skills were considered poor. Given the importance of these 'soft' skills in the workplace, this needs to be addressed within third level programmes.
- There is a heavy emphasis on the Technology/Science aspect of the food industry in third level education curricula. However, students' understanding of how these activities impact on overall business performance needs to be improved. Accordingly, more focus should be placed on developing students' commercial awareness and basic business comprehension. In particular, the ability to commercialise R&D needs to be further developed.
- No general management courses exist that span the three general areas of the food industry (technology/science, business/sales/marketing, and processing/engineering). To date, courses tend to be organised along functional specialism lines. There is a strong case to be made for additional broad-based courses to provide a better general management perspective.
- The industry view is that work placements should be made an even more central part of the curriculum. This experience proves extremely beneficial to both graduates and employers as graduates enter working life.
- The international and export orientation of the Irish food industry needs to be better reflected in third level curricula.

6.7 Curricula Overlaps

- As required by the Terms of Reference of this study, we identified the following areas of duplication and overlap at Certificate, Diploma, and Degree level. While recognising that there is a geographical spread of students in the country, there is a case to be made for greater college specialisation and focus, as exemplified by lessons drawn from the Danish and Finnish educational systems (see Section 8).
- Certificates in Food Science are available in IT Sligo and IT Dundalk.
- Certificates in Agricultural Science are taught at IT Waterford and GMIT.
- Diplomas in Horticulture are provided in IT Waterford and IT Blanchardstown.
- Food Science degrees can be obtained from UCC and UCD.
- Agricultural Engineering degrees are also taught in UCC and UCD.
- Food technology degree courses are available in three institutions, UCC, UL, and DIT Kevin St.
- Biotechnology degrees are provided in UCG, Maynooth, and DCU.

6.8 Summary/Conclusions

It is clear from the analysis undertaken for this study that third level food-related courses are heavily focused on the Food Technology/Science field. Equally, it is noteworthy that courses are organised along functional specialism lines and that there are no broad-based agri/food courses that span the three key areas of the food industry, namely, Food Technology/Science, Food Business/Sales & Marketing, and Food Processing/Engineering.

In terms of third level curricula, the technical knowledge of food graduates was acknowledged as a key strength. However, their people skills were considered by employers to be poor and these need to be addressed in future curricula developments. There is considerable regional overlap on food industry-related third level courses.

The popularity of food-related courses, as measured by student CAO preferences, is declining. This is also reflected in declining entry point requirements for these courses. While acknowledging the fall in the overall number of Leaving Cert students and a far greater availability of Third Level places, it suggests a negative perception by students of employment conditions and prospects in the food processing industry.

Over the longer term, this poses a serious challenge to the food industry as it ultimately depends on the quality of its graduates and its management capabilities as a key driver of success.

Unlike Denmark and Finland (the case study countries examined in Section 8), Ireland has a low propensity to provide vocational training of relevance to the manufacturing/processing sector (which includes food) at both second level and third level. This is also the case with the Institutes of Technology, where one would expect such education/training to occur. We believe that this matter warrants some informed consideration and debate.

7. The Provision of Training Courses and Services for the Food Processing Sector

Overview of Section

The terms of reference included identification of the main providers of training courses, both public agency/state providers and private enterprise providers, and profiling of the range and types of courses provided, with a view to identifying potential gaps in the provision of training services to the sector.

7.1 Key Findings

In all there are an estimated 110 unique training organisations/trainers involved in providing programmes to the food sector. Approximately 6 percent of these organisations are within the public sector, while 94 percent are private sector enterprises. There is a heavy concentration of training organisations involved in the Food Hygiene, Food Safety and HACCP/ISO areas, reflecting the obligation of companies to conform to EU Hygiene and Safety Regulations. There are correspondingly fewer players in the Sales/Marketing/Key Account Management and New Product Development/Food Science/Technology areas.

These organisations/trainers provide 401 programmes of which 2 percent are Diploma, 16 percent are Certificates and the balance are generally short (1-3 day) courses, workshops, etc. that are not nationally accredited.

While most of the state-provided programmes are accredited, the same is not true of many of the privately operated programmes. As such, the quality and consistency of such programmes may be subject to varying standards. This issue was raised by the industry as a matter of some concern. It is understood that all training providers will be encouraged to have their programmes independently assessed and accredited by FETAC, the new awarding body for further education, and that greater emphasis will be placed on companies using accredited programmes and trainers. The monitoring and validation of all programmes by this new body will be placed within the context of the National Framework of Qualifications, thereby rendering programmes without accreditation at a competitive disadvantage.

7.2 Research Methodology

Information on in-service training, in terms of providers and training programmes, is not collated centrally, apart from a list of all health and safety training programmes which is compiled by the Food Safety Authority of Ireland.

Consequently a broad-sweeping method of data collection was undertaken, whereby the main facilitators of private and public training (FÁS, FSAI, Teagasc's National Food Centre and Skillnets) were contacted for their databases of private and public training providers. Further interviews and consultations with industry experts identified other facilitators and providers of training in Ireland (i.e. UCC Food Industry Training Unit and DIT's Food Product Development Centre). Finally, the industry workshop (referred to under 'Methodology', Figure 4.7) helped to further expand and refine the database of training providers and training courses.

7.3 Private and Public Providers of Training

All training programmes that were identified during the course of our research are profiled in Appendices 6.1 (Public Sector Training Providers) and 6.2 (Private Sector Training Providers). Each individual training programme has been categorised as one of the following:

1. Diploma
2. Certificate
3. Short courses/Workshops, etc.

All programmes have been categorised as “courses” unless specifically identified as a Diploma or Certificate course by the provider. These courses are of various durations, including workshops, masterclasses, training seminars, etc.

Where highlighted by the provider, all Diploma and Certificate programmes have been identified as accredited by the relevant awarding body. However, it should be noted again that many programmes are not accredited by a national awarding body such as FETAC.

All training programmes have been categorised under a number of subject-matter headings. Table 7.1 below displays the sub-categories of programmes available and the various categories that they fall into.

Table 7.1

Category	Sub-Categories of Programmes
Food Hygiene	<ul style="list-style-type: none"> ● Programmes in Food Hygiene for all types of Food Handlers
Food Safety	<ul style="list-style-type: none"> ● Health and Safety for Food Handlers and Processors ● All types of programmes in Quality Management
HACCP/ISO	<ul style="list-style-type: none"> ● HACCP Principles and Procedures ● HACCP Implementation Programmes ● HACCP Management
Supplier and Internal Auditing	<ul style="list-style-type: none"> ● All types of Supplier and Auditor Training
Legislation	<ul style="list-style-type: none"> ● Food Legislation programmes ● Various programmes in Packaging and Labelling Legislation
Craft/Operative Trainers	<ul style="list-style-type: none"> ● Various programmes in Food Ingredients ● Food Processing ● Brewing Techniques
Sales/Marketing/ Key Account Management	<ul style="list-style-type: none"> ● All types of Marketing ● Business Development ● Sales and Key Account Management ● Communications
NPD/Food Science and Technology	<ul style="list-style-type: none"> ● New Product Development ● Programmes in Idea Generation ● Project Management ● Business Plan Development ● Dairy/Brewing Technology
Production/Operations Management	<ul style="list-style-type: none"> ● Programmes in Management Training ● World Class Manufacturing ● Food and Drink Manufacturing ● Meat/Poultry/Butchery Operations
Train-the-Trainer	<ul style="list-style-type: none"> ● Train-the-Trainer ● Trainer Skills

Table 7.2 below indicates the number of training providers by category and the number of private and public sector training providers involved in each category. The figures under the last four categories (*Sales/Marketing/KAM, NPD/Food Science and Technology, Production/Operations Management and Train-the-Trainer*) are divided into two sections. The bottom section of each box indicates the number of *food industry specific* trainers in that category and the top section indicates the number of general trainers in that category (i.e. many trainers in these categories train across a number of sectors).

Table 7.2: Number of Training Providers by Category

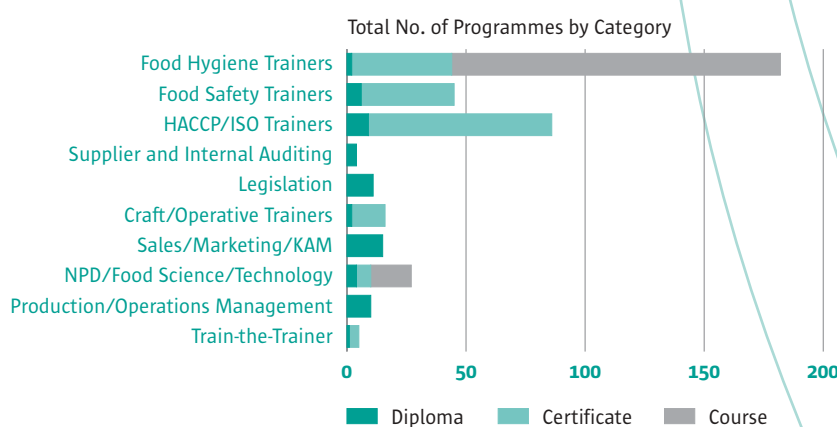
Training Organisations	Food Hygiene	Food Safety/ Quality	HACCP /ISO	Supplier and Internal Auditing	Legislation	Craft/ Operative Trainers	Sales/ Marketing KAM	NPD/ Food Science/ Technology	Production/ Operations Management	Train-the-Trainer	Total Unique Trainers
No. Public Trainers	4	5	4	1	2	2	1	4	1	1	7
No. Private Trainers	88	27	50	3	4	5	9 2	4 2	2 4	1 3	103
Total Trainers	92	32	54	4	6	7	12	10	7	5	110

Two main observations can be drawn from Table 7.2:

- There is a concentration of providers in the first three areas of Food Hygiene, Food Safety and HACCP/ISO, reflecting the more stringent Food Safety and Hygiene EU and national regulations introduced in recent years;
- There are significantly less trainers involved in the more discretionary types of training. Training in Supplier and Internal Auditing, Legislation and Craft/Operative Training is sparse, whilst training in Sales/Marketing/KAM, NPD/Food Science/Technology, Production/Operations Management and Train-the-Trainer is virtually undeveloped by food industry trainers, reflecting the current apparent of lack demand by the sector for specialist training programmes of this nature.

The graph below displays the concentration of programmes across the categories.

Figure 7.1: Concentration of Programme Across Categories



8. Education and Training Services in Denmark and Finland – Key Lessons for Ireland

Overview of the Section

This section profiles the training and education models of two leading European countries with a view to drawing lessons, where possible, for Ireland. Denmark is regarded as a leading food producing and exporting country, while Finland is perceived as having a differentiated approach, and a focus on functional and hi-tech food products.

Both countries are profiled under the following headings:

- (i) Size/Importance of the food processing sector
- (ii) Background Structure to the education and training system
- (iii) The Upper Secondary Level
- (iv) Higher Education
- (v) Adult Education
- (vi) Stakeholders in the Education and Training System
- (vii) Financing the Education and Training System
- (viii) Summary.

The final part of this section identifies the lessons for Ireland based on the analysis of the education and training systems in both countries. A more detailed profile of both countries is included in Appendices 7.1 and 7.2, respectively, of this report.

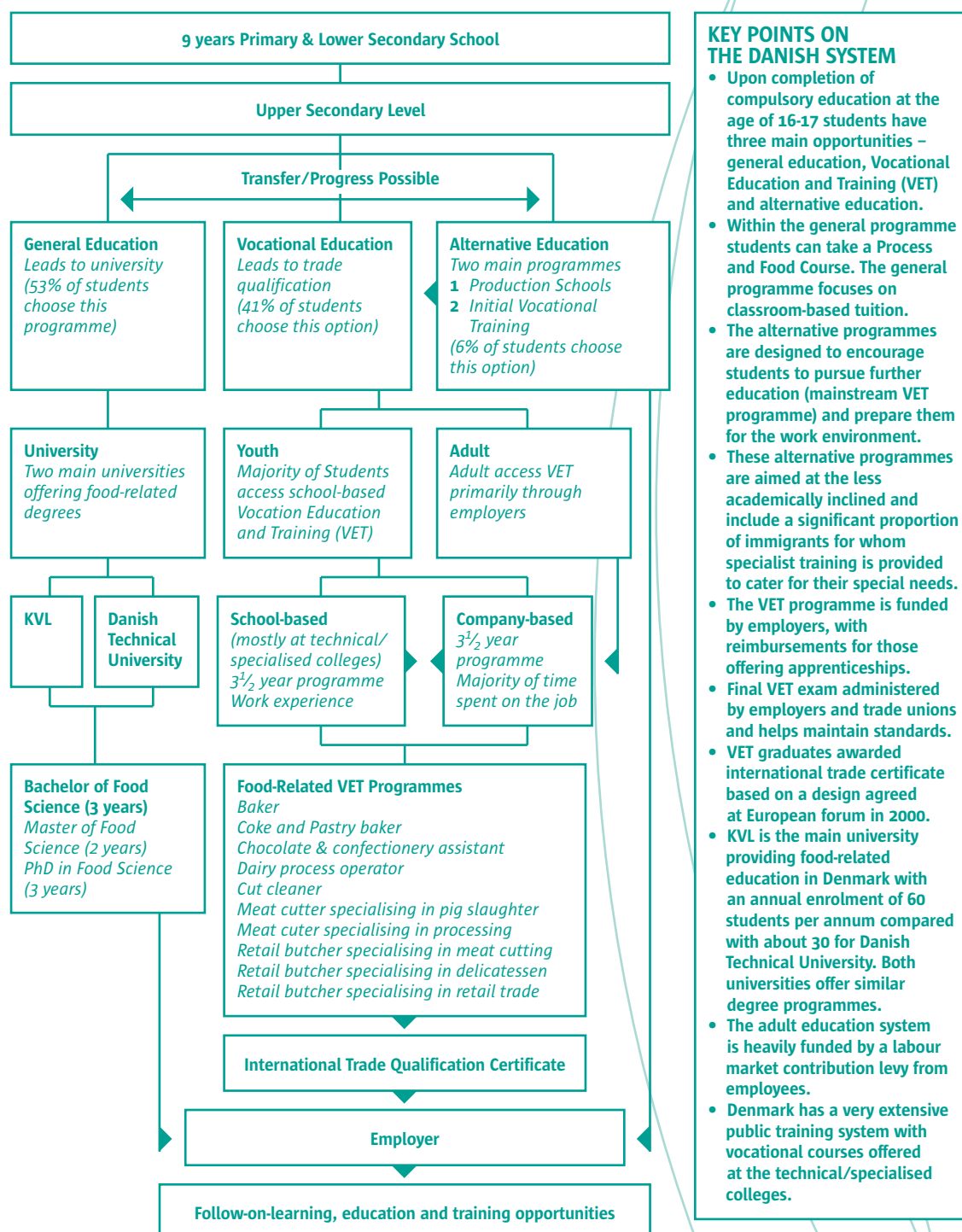
8.1 Denmark

(i) Size/Importance of the Food Processing Sector

Food processing and primary agriculture account for 5 per cent of GDP in Denmark, 17 per cent of total export earnings and employs 7 per cent of the workforce. In 2001, food production totalled €16 billion and accounted for just under a quarter of total industrial production.

Denmark is a major agri-food exporting country, with nearly half its production sold abroad. Major exports include pork, cheese, beef and milk. Agri-food exports in 2001 were €8.3 billion, compared with imports of €3.1 billion.

Figure 8.1: Diagrammatic Overview of the Education and Training System in Denmark



Source: PricewaterhouseCoopers.

(ii) Background Structure to the education and training system

Denmark has a long history of investing in its education and training system. According to the latest OECD *Education at a Glance 2002*⁴, Denmark is ranked as the leading EU country in terms of expenditure on education as a percentage of total public expenditure, (overall Denmark is ranked 5th out of 30 OECD countries, with Ireland in 9th place and Finland in 12th place).

4 OECD, "Education at a Glance 2002, October 2002", OECD Paris.

Concentration on human abilities has been regarded as necessary for a small country such as Denmark, which is very limited in terms of physical natural resources⁵. In assessing Denmark's opportunities in international competition, Madsen and Larsen (1998) in *“Training and development in the Danish context: challenging education?”* concluded that:

“Denmark's only possibility of expansion is to become Europe's Japan. Denmark has, as Japan, intelligence as the only raw material and has therefore no other opportunities than to mobilise this energy source.”

Central Government in Denmark exercises considerable influence and control over education. The Danish education model places a heavy emphasis on practical experience in addition to academic standards when considering the admission of students to third level academic programmes.

In recent years there has been substantial reform at all levels of the education and training system. The aim of these reforms has been to strengthening the alignment between education and industry.

These reforms envisage that the future principal agents in the areas of education, research and industry will be the educators and the business community. Government's involvement will be primarily a 'supporting role' acting as a 'strategic agent' in the capacity of promoting dialogue and goal-setting inside a flexible legal framework.

(iii) The Upper Secondary Level

Students enter upper-secondary programme at the age of 16-17, following completion of compulsory education, known as *Folkeskole*. The syllabus in the compulsory programme is uniform in nature. At upper secondary level in Denmark students have two main avenues of opportunity:

1. To pursue the general education programme that primarily leads to admission to university education (53% of students); or
2. The Vocational Education and Training (VET) programme that leads to a trade qualification (41% of students).

The remainder of students pursue alternative type courses (e.g. production schools or vocational basic training courses designed to prepare them for a mainstream course or to enter the workforce).

General Education Programme

The syllabus for this programme focuses predominantly on general subjects such as languages, science and mathematics. However, it is possible to take a technical course within the general education programme. The main food-related technical option is known as **Process and Food**. Students opting to combine a technical subject (such as Process and Food) with general studies normally attend a technical college. Technical courses are taught in a classroom-based setting where the focus is on the theoretical aspects of the subject. The general education programme is completed after three years and is the main supply source of university entrants in Denmark.

VET Programme

The VET programme in Denmark provides students with a wide range of opportunities to gain a trade qualification.

The food-related programmes tend to take place in technical or specialised colleges such as Dalum Technical College and Roskilde Meat Trade College.

Students can participate in a VET programme under the school-based model or through an employer-sponsored apprenticeship. The majority of students access the VET programme through the school-based route.

⁵ Madsen, M. and Larsen H. (1998) "Training and development in the Danish context: challenging education?" *Journal of European Industrial Training*.

VET Employer Sponsored Route (Apprenticeship)

The apprenticeship model is funded under a government levy, known as the AER, imposed on all employers in Denmark. Under this scheme, employers offering apprenticeship positions are reimbursed. In this manner the AER fund acts as a redistributive mechanism between those employers that do and those that do not offer training opportunities. The acceptance of this levy funding mechanism appears to stem from the high level of co-operation that exists between employers and trade unions in Denmark.

A characteristic of the apprenticeship model is the high levels of ongoing commitment required from both apprentices and employers. According to industry informants, three fundamental economic factors underpin this commitment and support the continuing significant role of the apprenticeship model in Denmark.

- It provides a source of high quality workers with a strong reputation. A competitive apprenticeship wage is paid, relative to the skilled wage. Apprentices tend to become productive relatively quickly thereby ensuring the model remains economically viable.

The vocational programmes consist of a basic course, which is the introductory part of the program, lasting 6 months, and a main course, which makes up the remainder of the programme's duration, generally lasting 3½ years. The course is structured as a “sandwich-type” programme, in which periods of theoretical education at school alternate with periods of practical training in a business enterprise.

The final assessment of students in a VET programme, known as the ‘journeyman’s test’ is carried out by industry and trade union representatives. This is a vital component, which ensures the quality of the VET graduates but also ensures the programme remains relevant to industry needs.

In July 2002, the Danish government began granting an award known as a ‘Certificate Supplement’ to candidates who have successfully completed a vocational education and training course. These certificates are the Danish equivalent of a pan-European Certificate Supplement designed by the European Forum in 2000. The content of the supplement is based on a description of the objective, duration and final qualification of the vocational education or training programme. The certificates are published in Danish, French, German and English in a standardised format and give a short list of the skills and qualifications achieved by an individual who has successfully completed the course. This facilitates pan-European recognition of the qualification and the inter-country mobility of labour.

At the upper secondary level a number of other alternative education structures exist, which act as a broad sweep for those students for which the main systems are less suited. The two main options here are Vocational Basic Training Programme and the Production Schools. Both programmes cater for students who are less academically minded and aim to both encourage students to go to further education and to attain the necessary work skills to enter the labour market. A substantial portion of the student intake tends to be members of various immigrant groups who are lacking the skills and pre-conditions necessary to enrol on a VET programme.

(iv) Higher Education Level

The university system in Denmark reflects the Anglo-American 3-2-3 model; primary degrees require three years academic study, with a follow-on of two years academic study to attain a Master’s degree and an additional 3 years for PhD level. The main food-related courses at third level in Denmark are offered at Royal Danish Veterinary and Agricultural University (known as KVL) in Copenhagen, in co-operation with the Danish Technical University.

Most students in Denmark tend to pursue the Master's programme upon completion of their primary degree. The MSc programme provides candidates with the opportunity to specialise in Dairy, Meat and Food Sciences and Technology. The Department of Human Nutrition at KVL also offers a graduate programme in human nutrition. Approximately 300 Food Science students are enrolled at KVL, and approximately 40 PhD students are employed at the Department of Dairy and Food Science.

(v) *Adult Education*

The key features of this system are:

- Its extent: there are more than 2,000 different courses available within more than 50 sectors/occupations, including agriculture and dairy.
- Scope: much of the training is directed at employed skilled and semi-skilled workers; it is not simply for the unemployed (see Table 8.1).
- Co-determination principle: the social partners are closely involved through the Training Advisory Council and sector committees in drawing up the curricula and ensuring that the courses provided meet the needs of industry.
- Funding for adult education and training is based on a levy system funded primarily by employees, through a levy known as the labour market contribution which amounts to an 8% tax on income⁶.
- The courses tend to be relatively short and intensive lasting up to six weeks duration. The courses can be arranged flexibly, i.e. continuous full-time instruction during the daytime, part-time or evening classes, etc.
- Courses are offered at the universities and technical colleges in Denmark.

Training opportunities are available within more than 50 sectors/occupations, offering more than 2,000 courses (95% of which provide a nationally recognised competence). These courses include programmes specialising in the dairy, meat and agriculture sectors. The courses are modular in format and can be combined to gain a nationally recognised vocational qualification.

Table 8.1: Number of participants on Danish adult education courses, 2000

Employed	Unemployed	Unknown	Total
266, 730	25, 723	404	292,857

Source: AMS, 2000.

This extensive public training system is largely accepted and used by industry. The main reason for this is the high level of 'ownership' employers feel they have in relation to the system through their representation on the national, local and sectoral committees that influence the decisions made by the Minister of Education affecting the adult education system.

(vi) *Stakeholders in the Education and Training System – Industry Input*

A high degree of co-determination exists between employers, trade unions and educators in the Danish education and training system. In the initial (youth) VET system, the social partners are heavily represented on both national and local committees which provide stakeholders with input into areas such as objectives and structures, admission requirements, qualification standards and needs, certification and quality issues related to education and training programmes. These views are fed through a National Council that advises the Minister of Education on policy issues. The same close involvement of employers and trade unions extends into the adult vocational training system.

In the university sector, the Danish government has recently launched two major initiatives to promote interaction between educators and industry.

⁶ The 8% labour market contribution is used to fund other Government interventions in the labour market apart from training such as unemployment benefit and assistance, etc.

1. In November 2001, the Ministry of Science, Technology and Innovation was created. The primary objective of this new Ministry is to promote the interaction of industry with centres for research and education and to strengthen the co-ordination between research, education and industrial policy.
2. In October 2002, the Government announced a programme of reform for the university sector in Denmark. This reform is based on three pillars:

Management reform – introduction of industry leaders at various levels at the universities

Education reform – ensure broader bachelor degrees and more flexible and modular master degrees

Governance and institutional reform, which will ensure the universities self-governing status and greater independence in the planning and organisation of their activities

The main goal of this reform is to create a broader space for interaction between the universities and the public and private sector.

These reforms envisage that the future principal agents in the area of education, research and industry will be the educators and the business community. Government's involvement would be primarily a supporting role, acting as a 'strategic agent' in the capacity of promoting dialogue and goal-setting inside a flexible legal framework.

In 2003, the Ministry will present a separate action plan for increased interaction between knowledge institutions and the business community. It is anticipated that the action plan will specify direct interface linkages that should be cultivated between the two groups.

(vii) Financing the Education and Training System

In Denmark, education from primary to tertiary level is financed directly by the State. The training system is funded indirectly by the State through levies imposed on employees and employers.

The initial VET programme is financed from contributions from all employers through a payroll levy system. The scheme operates by redistributing money to employers offering apprenticeships from those that do not.

The adult VET programme is financed primarily by way of a labour market contribution of 8% tax on those employed.

At an overall level the Danish education and training system is to a large extent funded both directly by general taxation and indirectly by levies on employers but particularly employees. This system represents, in effect, a public subsidy to firms to train because the balance of funding falls on the individual rather than on enterprises. The economic case for this rests, as the OECD notes, on "the high social benefits accruing from the training of the workforce, especially for an economy with a large number of small and medium-sized enterprises which would not have incentives to undertake this investment without a public subsidy".⁷

(viii) Summary

Denmark plays a leading role in the international food industry, with substantial export volumes. The heavy investment in the Danish education and training system is seen as a means of deepening the knowledge base and securing the future competitive position of its food industry.

A defining characteristic of the Danish education and training system is the high level of co-determination between employers, trade unions, education institutions and the government. This gives rise to a system that has the flexibility to adapt to the changing needs of industry and the workforce.

Moreover, both the initial and adult education and training systems provide flexible and well-structured opportunities for those working in the food industry. These courses range from specialised Bachelor and Master's level degrees to more general vocational programmes aimed at providing proficient manual and skilled labour to the industry.

The dairy industry forms a major sector of the food processing industry in Denmark. This is reflected in the courses on offer in both the technical colleges and universities in Denmark. In recent years the dairy industry has taken steps to compete effectively against other sectors of the economy in order to attract high calibre employees. These steps include marketing campaigns in newspapers and magazines, presentations at schools and other highly visible media to promote a career in the industry. These efforts help to maintain a certain prestige in being employed in the dairy and wider food processing sector. The Danish consider this to be important in ensuring a sufficient flow of high-calibre graduates to the industry.

8.2 Finland

(i) Size/Importance of The Food Processing Industry

The food industry is an important sector of the Finnish economy. It is the fourth largest industrial segment behind metal engineering, forestry and chemical industries. The gross value of food production in 1999 was €8.08 billion, giving rise to employment levels of 42,000.

The main areas within the Finnish food industry are meat processing, bakery products, dairy and fruit and vegetables. Around 85% of the food consumed in Finland is produced nationally. The value of exports in 2001 was nearly €1.0 billion and comprised of a wide range of products such as cheese, sucrochemical products, butter and other milk fats.

(ii) Background Structure to the education and training system

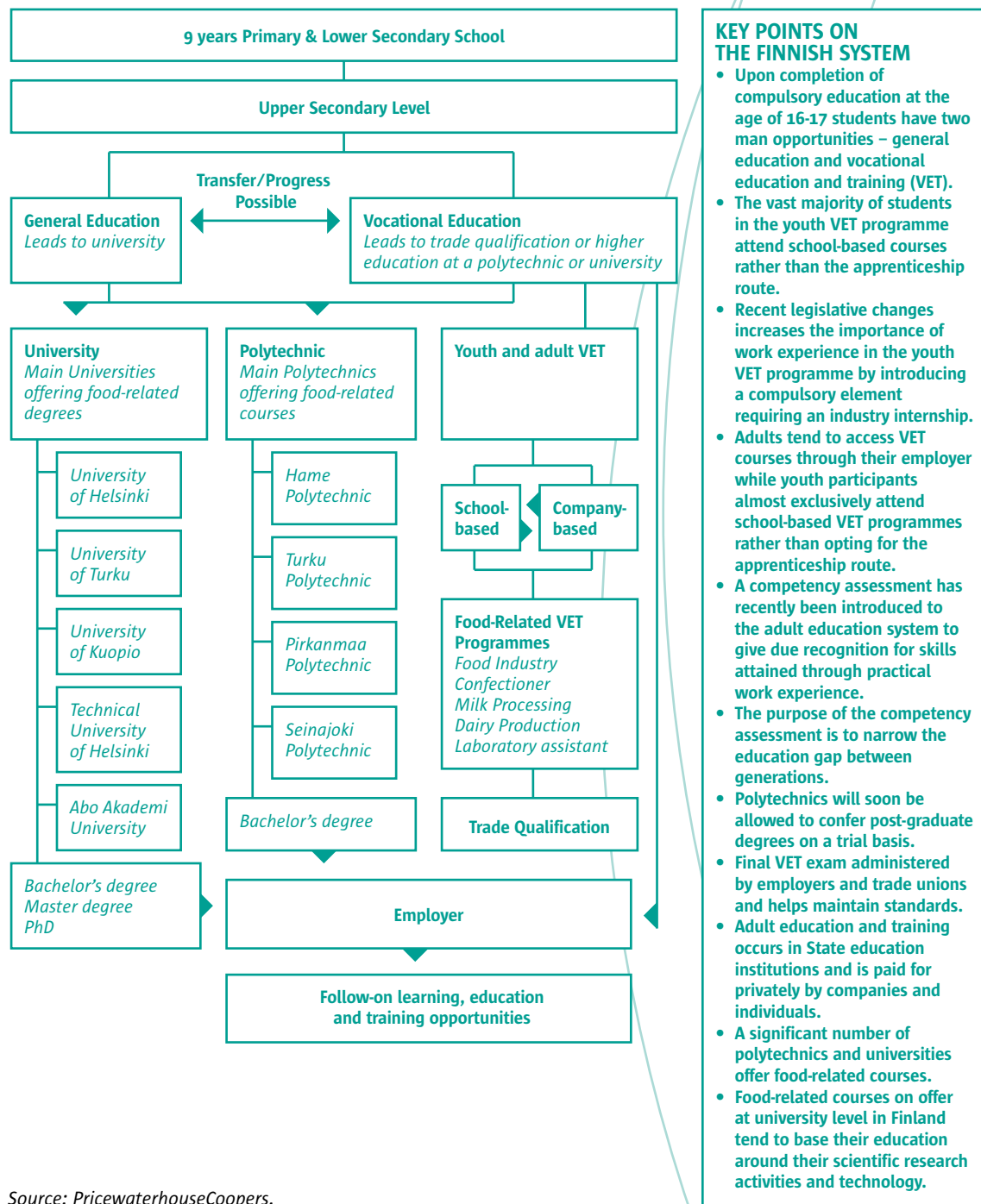
The Finnish education system shares similar structural features with the Irish system (see Figure 8.2). Within the Finnish system there are a number of interesting features related to the food industry. These include:

- School-based vocational education and training programmes specifically developed for careers in the food industry
- A polytechnic system introduced in the 1990s offering non-university degree programmes including food-related programmes
- Strong focus on science and technology in third level curriculum
- A national network co-ordinating food research in the polytechnics and universities with the needs of food industry
- A national fund supporting research into food and health and promoting linkages between industry and educators.

(iii) The Upper Secondary Level

Upon completion of the compulsory education programme at the age of 16, students can pursue one of two main options; (a) 'general' education usually leading to university/polytechnic studies or (b) a vocational education and training programme leading to a trade qualification. Within the Vocational Education Training Option the potential also exists for students to transfer/progress to further educational programmes at polytechnic/university level. A short description of both programmes is outlined below.

Figure 8.2: Diagrammatic Overview of the Finnish Education and Training System



Source: PricewaterhouseCoopers.

General education programme

The general education programme can be accessed by all students who have successfully completed the compulsory programme which lasts for three years. The programme requires the completion of at least 75 courses (the average length of one course is 38 hours).

Finnish students are not tied to 'class years'. Instead, students may choose when to take a course provided by the school. In other words, a student's progress through the upper secondary level is not measured in form years. In practical terms the system provides students with the opportunity to choose the timing of courses that best suits their needs. Students must complete the syllabus within a maximum of four years and a student may only be granted an extension of the completion period by exception.

Upon completion of the general upper secondary programme, students sit the matriculation examination, which provides general eligibility for further studies at institutions of higher education. The matriculation examination is held in the spring and the autumn and students may complete the examination either in parts or entirely in one examination period.

The language of instruction at an institution providing general upper secondary education is either Finnish or Swedish.

Vocational Education and Training

Major reforms of the VET system at both a secondary and tertiary level were introduced in the late 1990s. The core principles of the reform included extending the range of the qualifications, increasing on-the-job training and improving links between schools and employers, thus promoting employment.

Other reforms of the VET system include the abolition of divisions between institutions according to their field of education and the extension of the programme to a minimum of three years. Hitherto, schools were very restricted by their 'education licence' in providing instruction outside of their education charter, granted by the Minister of Education. VET schools have now become larger and more multidisciplinary in form.

In 2001, all programmes leading to upper secondary vocational qualifications were extended to a minimum of three years and include a period of on-the-job learning with a minimum duration of six months. On-the-job learning is agreed through a written contract between the workplace and the education provider. As a rule, on-the-job learners do not have contracts of employment with the employers.

The training on offer in Finland covers many branches of trade and industry. The programme can be broken down into seven sectors:

- Natural resources sector;
- Technology and transport sector (including food sector);
- Business and administration sector;
- Tourism, catering and home economics sector;
- Health and social services sector;
- Culture sector;
- Leisure and physical education sector.

Students receive basic general and vocational skills on all VET programmes as well as specialised vocational expertise in a particular field. Within the technology and transport sector students have the opportunity to choose between the following food-related specialisations:

- Food Industry;
- Confectionery;
- Milk Processing;
- Dairy Production;
- Laboratory Assistant.

The reformed upper-secondary vocational qualifications include a demonstration requirement to prove the achievement of the objectives of vocational studies. These skills demonstrations are planned and organised in co-operation with businesses and other representatives of working life.

All vocational qualifications available at educational institutions in Finland may also be obtained through apprenticeship training. However, in practice the vast majority of students in Finland have tended to access the VET programme through the school-based route rather than through apprenticeship training. The latest available figures indicate that the annual number of students enrolled in all industry apprenticeship programmes in Finland (including the food processing industry) was 610. Owing to the very small numbers involved in the apprenticeship route, a detailed description of the programme is not included.

Finally, it is worth noting that in Finland, lecturers in the VET programme are encouraged, on their own initiative to participate in industry work opportunities during their student's own practical training periods. The vocational institutions recognise that information tied to a practical occupation can become outdated more rapidly than purely theoretical and general information and therefore encourage staff members to supplement and update their own competence.

(iv) Higher Education

The concept of higher education was defined in very narrow terms in Finland up until the 1990s. The system was primarily university-based, with very limited opportunities in higher vocational education. The university model was firmly rooted in a didactic model focused on education through research.

In the early 1990s the Finnish government saw the need to reform and develop the non-university higher education system. The goals included raising the level of education and upgrading vocational post-secondary education into higher education degrees. A total of 22 temporary polytechnics (institutions of vocational higher education) were established by combining 85 educational institutions, which had previously provided vocational post-secondary education by upgrading their education to meet the standards of higher education.

The general requirement for admission to polytechnics is successful completion of general or vocational upper secondary education.

A large proportion of food-related higher education programmes in Finland have a high technology/science focus. Typical examples of this are the courses on offer at Turku and Hame Polytechnics, which offers degree courses in biotechnology and food technology.

Similarly, at university level the emphasis on food-related degree programmes is firmly on technology and science. For example, the Universities of Helsinki, Turku and Kuopio all focus very heavily on the scientific properties of food and various aspects of the nutritional/medical characteristics of food.

Typical subjects on a food science degree in Finland include: human nutrition, food chemistry, food technology (with the option to specialise in dairy, meat or cereal technology) food microbiology, food economics and marketing.

Finnish universities have an international record in food-related research. These research activities are partially funded by Tekes, the National Technology Agency, under a four-year €50m innovation fund concentrating on the links between foods and health. The aim of the research is to promote consumer-oriented product development and the commercial application of new food technologies to help reduce the risks of heart disease, cancers and digestive problems.

University and polytechnic research programmes in Finland are co-ordinated by The Centre of Expertise for Food Development (known as ELO) – a national network that seeks to improve the competitiveness of foodstuffs production in Finland.

The ELO co-ordinates the activities of State-sponsored research and education programmes with the needs of industry. The network acts as a conduit for knowledge transfer in food-related research. The aim of the network is to involve businesses, particularly SMEs that have not been accustomed to using research and development services.

The Centre aims to meet the needs of business and to raise the national competence of the food sector in the following areas:

- Improvement of the processing level of foodstuffs production
- Exploitation of the strengths of Finnish foodstuffs
- Management of a customer-centred chain of commercialisation
- Promote both national and international networking and co-operation
- Exchange of information and expertise.

The Centre takes the form of a network of five research institutes and seven regional centres covering most of the country. Each node of the network has its own national specialisation, while the network as a whole is co-ordinated by a special purpose company owned by the State known as Agropolis Ltd.

(v) Adult Education

Features of the adult education and training system in Finland are that:

- The adult education and training system in Finland operates along similar lines to the initial vocational education and training programme.
- The main centres for adult education and training are 43 vocational adult education centres located throughout Finland, university centres of continuing education and the polytechnics.
- Adult education and training is primarily privately financed by companies and individuals.
- In-company training accounts for the largest number of participants and tends to be short-term in nature in the adult education sector.
- Competency-based vocational qualifications introduced to narrow the generation gap in educational attainment and to install a national quality assurance system covering the whole field of vocational adult education.

While it is difficult to identify statistics for adult education and training in the food processing sector, at a general level in-service training accounts for the largest number of participants and appears to be an important feature of the Finnish labour market. In 2000, more than 43% of Finnish workers participated in in-service training, with an average training duration of 4.0 days (see Table 8.2).

Table 8.2: Employee participation in in-service training, 2000

Employees Total	Employees receiving in-service training	Proportion of all employees %	Training days per participant
2,006,000	869,000	43.3	4.0

Source: Statistics Finland.

(vi) Stakeholders in the Education and Training System

Similarly to the situation in Denmark, the Finnish vocational education system promotes representation from employers and trade unions on decision-making bodies. This includes representation on the national Advisory Board for Education and Co-Operation, which advises the Minister of Education on all vocational education and training issues including the core curricula. The task of the Advisory Board and sectoral training committees is to promote interaction between educators and industry.

At a higher education level, recent legislation allows for industry representatives to be elected on to governing bodies of universities. However, no specific requirement is made in this regard. In Finland, it would appear that the relationships between universities and industry develop at a local rather than a national level. These relationships tend to be built quite strongly around research collaboration activities. For example, The Centre of Expertise for Food Development, discussed earlier, is a regional network that seeks to link the education and research activities of the universities and polytechnics with industry.

An interesting local initiative linking industry with educators is the Functional Food Forum recently established by the University of Turku. The primary purpose of the Forum is providing industry with a platform to harness the research expertise of the University and to develop new products.

(vii) Financing the Education and Training System

At most education levels, instruction is usually free of charge in Finland. The main exception is non-accredited adult education and training. The majority of adult education organisations in Finland receive support from public funds, irrespective of their form of ownership. Some adult education institutions finance their activities by selling educational services to both the public and the private sector. Apprenticeship training in Finland is almost entirely the domain of adult VET rather than initial VET programme. The apprenticeship model is financed almost entirely by the State: providers of apprenticeship training receive grant aid subsidies.

In-service training falls outside public funding and regulation to a large degree; the expenses are usually covered by the employer. In-service training is primarily short-term supplementary training and employees are trained according to the company's own operational needs. Employees usually receive normal salary for time spent training and participation in the training is decided by the employer.

S u m m a r y

Similarly to Denmark, Finland provides a well-funded VET programme that provides structured entry points for students at upper-secondary and tertiary level interested in pursuing a career in the food industry. Students wanting to enter the trades receive formal instruction over three years with a mandatory work placement lasting six months. The university programmes and the polytechnics tend to offer food-related courses with a heavy emphasis on scientific research. This approach provides graduates with the capability to undertake highly complex research in the areas of biotechnology, food chemistry and functional foods.

L e s s o n s f o r I r e l a n d

The development over the years of both the Danish and Finnish education and training systems reflect endogenous changes in the political, economic social and cultural influences in their respective countries. As such, national education and training systems operate within a wider context of society. This is an important consideration in deliberating on the 'importability' of national education and training policies into an Irish context. Differences that may exist in social and industrial relation structures of individual countries may obviate the relevance or appropriateness of adopting such measures. However, the review of the systems that exist in both Denmark and Finland provides some food for thought for the Irish context, as follows.

D e n m a r k

- There is an ongoing promotion campaign supporting a career in the food industry with advertising on bill boards, newspapers, magazines and other media to attract high-calibre work force.
- Apprenticeships continue to play a significant role within the overall education and training system.

- The focus of the apprenticeship system in Denmark is primarily on the SME sector. The apprenticeship model has a strong reputation for producing entrepreneurs who make up a sizable proportion of the Danish industrial sector.
- According to industry informants, the Danish investment model represents a good investment because:
 - It provides a source of high quality workers with a strong reputation.
 - A competitive apprenticeship wage is paid, relative to the skilled wage.
 - Apprentices tend to become productive relatively quickly thereby ensuring the model remains economically viable.
 - The interests of both trade unions and employers are served in ensuring high quality graduates from the VET programmes. Employers and trade unions play an important role in monitoring and evaluating students to ensure standards are maintained.
 - The sense of 'ownership' associated with the VET system by the social partners, in particular employers, appears to be an important factor in its success.
 - Tailor-made programmes focused on ensuring that immigrant workers, among others, receive adequate training to become productive members of the labour force.
 - A funding levy that minimises the financial barriers to employees, particularly in the technical and craft skill areas, in undertaking retraining and education to update their skills.
 - Existence of dedicated educational establishments for the development of the food industry in Denmark with an international reputation, e.g. Dalum Technical College, Roskilde Meat College, Royal Danish Veterinary and Agricultural University.
 - Internationalisation of the education institutions has led to Denmark achieving a certain measure of success in exporting industry expertise and know-how abroad.

Finland

- An unambiguous drive and investment in R&D technology in functional foods, food chemistry and biotechnology, as Finland moves to recreate 'the Nokia success story' in the world food industry (e.g. Tekes €50m R&D fund directed specifically at exploring opportunities in this area).
- Strong levels of co-determination in the education and training system, with significant representation from the social partners in decision-making bodies at a local and national level.
- Strong encouragement for lecturers to maintain links with industry and to work in the private sector periodically to ensure their knowledge remains current.
- A well-developed VET programme that provides students with the opportunity to pursue specialist courses in the food processing industry.
- Generously financed education and training system that minimises financial barriers to citizens pursuing education and training opportunities.
- A well-established network of expertise in the area of food science that operates as an effective conduit in the dissemination of information between research and industry.

9. Recommendations for an Integrated Human Resources Development Strategy for the Irish Food Processing Industry

9.1 Introduction

The food industry is facing a variety of significant challenges over the coming decade. Central to the industry's ability to meet these challenges is the quality and skill levels of its management and workforce. Accordingly, education and training development will be increasingly important inputs into the long-term strategic development of the industry.

Where there are many drivers-of-change identified earlier in this report, they can generally be grouped under a number of common themes. These include:

- Policy and regulatory
- Industry structure
- Technology
- Purchasing developments
- Consumer requirements
- Domestic and international economic developments.

Allowing for the fact that the effects of such drivers will inevitably vary by sub-sector, the direction of change in the food industry is clear. The food market of the future will be characterised by:

- Greater degree of market liberalisation
- Higher levels of food regulation
- Greater intensity of competition
- More consolidation across all sectors
- Market-led rather than production-driven
- Increasing sophistication of both trade buyers and consumers
- Higher levels of technology
- Consumers more demanding, less homogenous in terms of lifestyles and tastes.

In summary, these forces are likely to result in a much more demanding competitive environment and consequently, different and higher levels of skills will be required to compete successfully.

A summary of the key skill gaps identified in Section 4 and the main barriers to training as outlined in Section 5, are recapped below.

Figure 9.1: Summary of Critical Gaps Identified in the Food Processing Sector

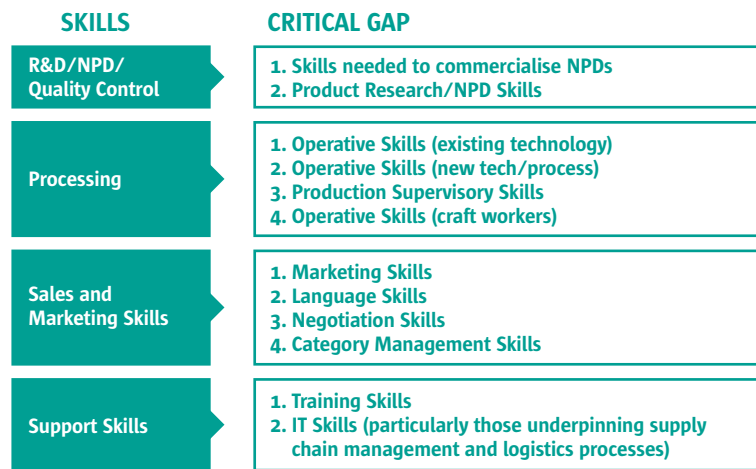


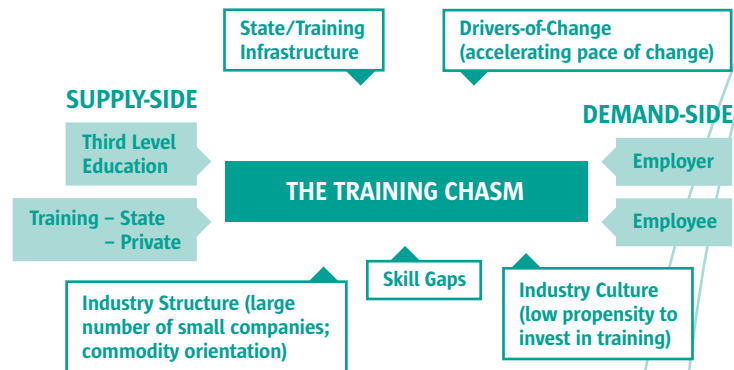
Figure 9.2: Impact of Barriers to Training

		Obstacles to Training		
Barrier to Training		High	Medium	Low
Demand	Availability of suitable courses		✓	
	Quality guarantee of course		✓	
	Availability of training locally			✓
	Lack of centralised info on courses/training providers		✓	
Supply	Indirect costs	✓		
	Direct costs	✓		
Policy	Grant aid allocation criteria	✓		
	Grant aid application process		✓	
	Confusion with respect to role of relevant state agencies			✓
	Immigrant workers – language barriers			✓
	Poor literacy/numeracy skills			✓
Company Specific	Disturbance to business	✓		
	Staff retention – post training		✓	
	Management understanding of the role of training	✓		
	Demand for training not prompted by employees			✓

While there are a range of barriers to training, there is equally a broad range of state and private sector training providers and training courses available to food companies. Funding incentives are also available, principally through Enterprise Ireland and FÁS.

Given the drivers-of-change, and the accelerating pace of change in the international food business, there is an increasing business imperative to invest in training. However, despite these incentives, there is a low level of commitment to training across the Irish food sector generally.

The Training Chasm:



While the recommendations presented here will address both supply-side and demand-side initiatives, as well as the development of the state/training infrastructure, it is critically important that the central role of senior management commitment to training is recognised, if meaningful levels of training are to be undertaken. The industry needs to develop its management and staff, in line with evolving industry and business requirements. Management must recognise and accept its responsibility in strategic HRD, given its central role in successful corporate development. In this regard, management, more than any other stakeholder in this process, has to play the lead role in crossing the training chasm.

These recommendations are framed by the following vision for the Irish food industry, and underpin the critical strategic role of HRD within the industry's development.

Vision for the Irish Food Industry

The Irish food processing industry of the future will be:

- innovative, market-led and consumer oriented
- a dynamic, attractive and high profile sector, highly valued by employees and the public generally
- attracting the best potential employees at all levels by providing excellent career paths and career development opportunities
- led by senior management that are strategic in their approach and committed to ongoing staff development
- delivering competitive returns on investment.

Recommendations

Based on the research undertaken for this study, and noting the overall food industry context, five strategically important areas of initiatives were identified as critical to the future skills developments of the food industry.

1. Demand-side Initiatives:

- Employer focused
- Employee focused.

2. Supply-side Initiatives:

- Third level education
- Training.

3. Policy/Training Infrastructure Initiatives:

- State support and training infrastructure.

The recommendations are presented on a pan-sectoral basis, given the broad commonality of issues identified across the subsectors of the food industry. The industry survey and workshop findings support this approach. However, it is recognised that there are some subsector variations and nuances, arising from the differing impact of the industry drivers-of-change on these subsectors.

It should also be noted that the areas of recommendation are in broad agreement with recent major studies of both the agri-food industry and training in Ireland. These reports include:

- Food, Drink and Tobacco Industry – Sectoral Study Update (August 1998)
- AgriFood 2010 (March 2000)
- Report on In-Company Training (August 2000)
- Food Agency Cooperation Council on HRD in Food Processing (January 2001)
- Third Report of the Expert Group on Future Skills Needs (July 2001)
- Taskforce on Lifelong Learning (October 2002).

The remainder of this section outlines the specific recommendations under each of these five broad areas.

9.2 Recommendations

1. Employer Focused Initiatives – Rationale

Possibly the most critical element of any proposed national training strategy is the role of the employer. Ultimately, the commitment, or otherwise, of senior management to training and HRD will be the deciding factor in the type and level of training being undertaken.

Accordingly the recommendations place emphasis on communicating the benefits of a strategic approach to HRD and training to senior management. IBEC, EI and FÁS have significant roles to play in this regard. This approach must re-inforce and support the importance of a strategic approach to business development. In light of the evolving drivers-of-change, the strategic skills of senior management will be of even more significance in the future.

In addition, the need for a more structured and well resourced approach to the HR function and to HRD programmes, with the aim being to achieve better staff selection, induction, retention and development, is emphasised. This is particularly important given the low levels of unemployment in the economy generally. Allied to this, the industry and the representative bodies need to redress the poor image of the sector, particularly in terms of attracting graduate talent. Such graduates represent the management backbone of the future.

EMPLOYER FOCUSED INITIATIVES

Management to adopt a strategic approach to HRD

The short-term orientation of many of the companies in the food industry needs to be reversed. The food industry needs to adopt a more strategic approach to its corporate development and, accordingly, to recognise the importance of strategic HRD in underpinning and delivering on business plans.

This approach will reflect a greater awareness of the potential impacts of the major drivers-of-change, and assess their training implications for their businesses. It will also facilitate the shift from a producer-centric to a market-led approach to business development.

Recommendation I

- (a) **The food industry needs to adopt a more strategic approach to its corporate development and, accordingly, to recognise the importance of strategic HRD in underpinning and delivering on business plans.**
- (b) **Companies need to be better informed on the importance of the HRD – strategy link. This is a key role for Enterprise Ireland Development Advisors.**
- (c) **An Executive programme for senior management, concentrating on strategic management in the food industry, should be developed in consultation with Enterprise Ireland and FÁS.**
- (d) **A co-ordinated communication programme needs to be developed, by Enterprise Ireland, FÁS and IBEC, to inform and convince management of the importance of training in moving their business forward.**

Senior Management Training

Given the drivers-of-change, the changing role of management needs to be examined in the context of its implications for training. As the industry evolves, new management/strategic skills are required. Management training must take cognisance of these new skill requirements.

Recommendation II

An awareness campaign should be undertaken to promote the value of senior management training within companies.

Companies need to develop the HRD Function

Arising from a more strategic approach to HRD, companies need to develop:

- more effective induction and retention policies
- career counselling and planning support, including defined career plans (structured to allow for accession and progression)
- a supportive environment for training and training initiatives.

This will help to (i) address the issue of staff turnover through more cost-effective recruitment, and (ii) provide recognition and encouragement for staff commitment to training.

Recommendation III

Individual companies should work, in consultation with ICTU, to bring about:

- **greater resource commitment to the HR function**
- **formalisation of the recruitment process**
- **development of precise job specifications**
- **formalised induction programme**
- **continuous appraisal and assessment to facilitate career development.**

Employer of Choice

The food processing industry needs to commit to being “an employer of choice” for employees. This is particularly important, given the relatively poor image of the food sector among second level students, third level graduates and employees generally. It should have as an outcome an increase in the quality of candidates attracted to the food sector.

Recommendation IV

IBEC, in conjunction with Teagasc and third level colleges, should initiate an image development programme for the food sector, communicating its attractiveness as a career opportunity. It should have a particular focus on (a) attracting second level students into relevant third level food courses and (b) attracting graduates into food sector employment.

Graduate Food Fast Track Programme

There is a need for a formal induction and structured programmes to aid staff/graduate retention. This would help to improve the reservoir of management talent in food companies. Initiatives such as the EI/UCC Diploma in Management Practice provide an example to build on.

Recommendation V

A Graduate Food Fast Track Training Programme, centred on in-company experience, complemented by formal, external modules on critical topics, e.g. food safety, team-working should be developed by the relevant education and training providers for the full range of food companies and sectors. The programme should highlight the benefits at employer level.

2. Employee Focused Initiatives – Rationale

We recognise that employees have an important role to play in defining and addressing their training needs. In particular, trade unions have a critical role to play in staff training and development and should be placing more emphasis on this area.

The lack of a partnership approach between trade unions and employers in staff training is in marked contrast to the position pertaining in the countries examined in the international dimension of this study, namely, Denmark and Finland. Channels of communication between employees and management need to be improved in this regard.

Finally there is a clear need for a more aggressive promotional campaign targeting employees and promoting the benefits of both training and accreditation.

Over time, the attitude and culture existing in Irish food companies needs to change and progress with regard to training. This is the direct responsibility of both employees and employers. Allied to this, the trade unions, who represent the interests and well-being of employees, needs to consider the central role that they could play in conveying the benefits of training and life-long learning to their members.

*EMPLOYEE FOCUSED INITIATIVES**Partnership Approach*

There is a need for improved employee interest and motivation for training. It is recognised that some responsibility for training rests on the part of employees. Channels of communication to management in relation to training policies and programmes need to be established and/or improved upon.

Recommendation VI

IBEC and ICTU should jointly undertake the promotion and encouragement of life-long learning to employees, with better communication of both training needs and expected benefits.

Employee Focused Communication Initiative

In addition to Recommendation VI, a promotional initiative targeting employees, communicating the benefits of both training and accreditation should be undertaken by ICTU. This will be aimed at ensuring that there is better comprehension of the need for, and benefits of, in-service training.

Recommendation VII

A promotional campaign on the benefits of training and accreditation, targeting employees, should be undertaken by ICTU.

3. Third Level Education Initiatives – Rationale

As outlined in Section 2, there are a variety of significant drivers-of-change impacting on the Irish food industry. These are resulting in critical skill deficits in the food processing sector. One of the most direct means of addressing these gaps is via the third level education system. This is particularly the case in regard to management skill gaps. Indeed, it can be convincingly argued that for three of the four critical skill areas identified in Section 4 of this report – R&D/NPD, Sales and Marketing Skills, and Support Skills – initiatives involving the third level education sector are the most obvious and effective means of addressing these, particularly in the medium-to-long-term.

Accordingly, the recommendations in this section focus on developing and enhancing the relevance and capabilities of graduates for the food processing sector.

Specifically, a new body entitled the Innovation-in-Education-Exchange is proposed. While the Expert Group would share any reservations there may be in principle to the creation of any new structure at national level, is aware that some individual colleges have their own effective links to local industry, and notes that both HETAC and CHIU have initiatives aimed at strengthening education-industry interaction, it believes that, with appropriate Terms of Reference and energetic membership, the proposed Exchange would have the ability to radically change the third level–food industry interface and to significantly improve the quality of graduates and their relevance to the food industry going forward. There are at least five specific objectives for this Exchange, as follows:

- (a) Facilitate a high level interface between colleges and the food industry in order to improve the relevance of third level curricula to industry and to keep colleges abreast of industry issues and graduate requirements;
- (b) Overcome local and regional variations in terms of the quality of education – food industry interaction and allow the setting of a common, national agenda on curricula development. This process will also allow colleges to make informed decisions on identifying their own distinctive educational niches;
- (c) Formulate a strategy to enhance the image of the food industry as an attractive career opportunity for third level students;
- (d) Develop a national Code of Practice for student work placements and ensure food industry commitment to the process;
- (e) Allow an exchange of ideas on R&D projects and postgraduate research opportunities.

The other recommendations centre around adapting undergraduate and postgraduate courses to better match industry requirements in light of the drivers-of-change and on examining means of more effective dissemination of state and EU sponsored R&D.

THIRD LEVEL EDUCATION INITIATIVES

National Innovation in Education Exchange

The Third Level Sector and the Food Sector need to interact more effectively to the benefit of both parties in order to: (1) Address the relevance of curricula to industry; (2) Facilitate an interface between colleges and industry, thereby keeping colleges abreast of industry issues and graduate requirements; (3) Formulate strategy to enhance the image of the food industry as an attractive career opportunity for third level students; (4) ensure that student work placements are consistently effective; and (5) exchange ideas on R&D projects and postgraduate research opportunities.

Recommendation VIII

A National Innovation-in-Education-Exchange (IIEE), consisting of members drawn from the third level sector and industry, should be established to ensure that college curricula development takes industry requirements more fully into account.

New Undergraduate Approach

There is a need to boost overall industry standards in the critically important areas of food hygiene, health and safety. There is also a need to build on the technical capability of graduates, by developing people skills, thereby allowing them to become more effective employees more quickly.

Recommendation IX

Third level colleges should ensure that:

- (a) At undergraduate level, all food-related courses include modules on food hygiene and food safety; and**
- (b) In science and technology subjects, interpersonal/people/team-working skills should be enhanced via teaching methods used.**

General Management Undergraduate Course

The education system has a crucial role to play in producing a higher calibre of general manager specifically educated for the food sector. The changing needs of the sector require graduates with broader appreciation of the full spectrum of the food industry.

Recommendation X

Consideration should be given by third level colleges, to supplying graduate intake into the food sector possessing general management skills, covering the three main functional areas of food science, business and engineering.

Formally Defined Work Placements

By improving work placement arrangements, employment prospects of students will be enhanced and industry will benefit by recruiting better graduates with a more realistic understanding of the actual working environment.

Recommendation XI

A structured, formally defined programme of activities for work placements should be developed as a central, examinable element of certain undergraduate programmes. The IIEE should initiate this recommendation. Elements of this would be:

- (a) A code of practice for work placements**
- (b) Domestic and overseas work placements to be further developed, in partnership with industry, to enhance student experience**
- (c) Grading/examination of such placements to be introduced, cognisant of the difficulties of validating in-company experience.**

Specialist Postgraduate Programmes

New third level postgraduate curricula should be developed, with the focus on the commercial application of NPD and company-buyer interfacing skills.

A greater number of functional and medical/nutritional food-specific specialists in key developmental areas of the industry are required also. Significant work is already underway in UCC in this area – it may be possible to build on this initiative.

Recommendation XII

- (a) Existing postgraduate programmes, where appropriate, should be adapted by the third level colleges, to include core modules on commercialisation of Food NPD and Food Sales/Marketing.
- (b) A course should be developed in functional foods/nutrition/medicine.⁸

Build advanced R&D capabilities and skills

R&D innovation and NPD in specialist high-value niche areas, which in turn provide postgraduate doctorate research opportunities, are essential. The development of qualification criteria and priority areas for food-specific research programmes is required.

Recommendation XIII

Science Foundation Ireland (SFI) should be requested to explore a Food Technology/Biotechnology/Medicine⁹/Nutrition R&D programme – possibly as an element within the Biotechnology Programme.

Review R&D Dissemination

In order to improve R&D capabilities and stimulate new research ideas/development and commercialisation of existing research, there is a need to:

- (a) Maintain communication to industry on state sponsored R&D and companies
- (b) Encourage companies to appoint a contact person with responsibility to receive/interpret (RELAY, FLAIR FLOW) findings.

Recommendation XIV

The Department of Agriculture and Food and Teagasc, in conjunction with IBEC, should review the approach and methods used to disseminate State and EU sponsored food industry research, with a view to improving communications with industry, technology transfer and industry responsiveness.

Development Options – Second Level

By comparison with the Danish and Finnish models, there is an absence at second level of subjects related to industrial/manufacturing sector and programmes which would allow practical skills associated with food processing to be developed in advance of third level course selection.

There should be consideration and debate on:

- the merits of introducing industry focused subject areas (both generic and sector specific) into the Applied Leaving Certificate programmes
- the role apprenticeships might play alongside formal education at second level.

Recommendation XV

The IIEE should seek to stimulate debate on:

- (a) **The introduction of a programme at Applied Leaving Cert level focusing on basic/elementary management principles**
- (b) **Programme(s) focusing on food science/processing with significant practical focus.**

⁸ Medicine, as it relates to the health benefits of food products.
⁹ Medicine, as it relates to the health benefits of food products.

Third Level Development Options

There is also an absence at third level of programmes related to the industrial/manufacturing (food) sector, with the potential this could provide to build on skills developed in this area at second level (see previous recommendation).

The possible gap at third level, which prevents students from obtaining applied (technical/craft) food processing/manufacturing qualifications, should be addressed.

Recommendation XVI

The IIEE should seek to stimulate debate on the introduction programmes (cert/diploma) at IT level which would focus on the practical/theory/business skills associated with the craft sectors of the food industry, such as meat and dairy (cheese) processing.

4. Training Initiatives – Rationale

The second primary vehicle for skills and staff development (after third level education) is in-service or on-the-job training. There are two principal providers of such training, i.e. state sector and private sector training providers. FÁS, EI, Teagasc and CERT are the principal state agencies involved in the provision of such training, while there is a broad range of private training providers.

The principal recommendations on training which follow revolve around addressing the previously identified areas of skills weaknesses – R&D/NPD, general production management and operative skills, sales, marketing CRM skills, and support areas such as supply chain management.

In addition, it is recommended that National Centres of Training Excellence be established in a number of high priority areas including meat, dairy, consumer foods, and biotechnology. Such centres should operate at the nexus of applied research-knowledge-training.

TRAINING INITIATIVES

Companies need to think more strategically by addressing some critical skill lacunae. In time, all training courses and their providers should be nationally accredited, with a heightened focus on the quality and relevance of courses.

Critical Area of Skills Weakness

The four areas of skills weakness identified in this study are:

- (i) R&D/NPD – Lack of technical, scientific NPD skills, specifically for the food sector;
- (ii) General Production Management and Operative Skills – Affecting company and industry competitiveness;
- (iii) Sales/Marketing – Business development/Commercial/Market Development capabilities need to be enhanced;
- (iv) Support Skills – Food chain efficiency and competitiveness also needs to be developed.

Recommendation XVII

In response to the skills gaps identified, the enterprise development agencies (FÁS, Enterprise Ireland) in conjunction with Teagasc and third level institutions, should, as appropriate:

- (i) **Develop, expand and promote courses for beginner/intermediary/advanced companies on R&D Innovation Management, HACCP for HRD and Commercialisation of Ideas, such as those run by the various Teagasc Centres and UCC courses;**

- (ii) **Develop Best-in-Class Production Efficiency Programmes, particularly for commodity sectors. Dedicated sales, marketing food safety management and customer relationship management courses, specifically for SMEs should also be introduced; and**
- (iii) **Prioritise IT skills acquisition, in particular those skills underpinning supply chain management/ efficiency and logistics competencies.**

Immigrant Induction Programmes

Critical skills and knowledge gaps in regard to health and safety issues and regulations need to be addressed. It is recognised that programmes to address these will need to be framed within the current constraints of short-term permits governing this group of employees.

Induction programmes with a particular focus on health and safety issues and on food safety need to be further developed and delivered in various languages to immigrant workers. This initiative should build on the work completed to date by the Food Safety Authority of Ireland (FSAI).

Recommendation XVIII

Specialist induction programmes for immigrant workers should be further developed by FÁS, in consultation with Enterprise Ireland and the FSAI, and delivered in various languages to immigrant workers.

Expansion of “Train-the-Trainer” Model

National standards for both trainers and training programmes, accreditation of such programmes, and modularisation of their delivery should be established, where appropriate, incorporation of the ongoing e-learning initiatives within the context of this model should be considered. This will facilitate in-house delivery of training to accredited, national standards. Overcomes some key barriers to training.

Recommendation XIX

The existing FÁS model for in-company training and accreditation, approved by regulatory bodies and industry, and currently operating in the industrial meat sectors, should be rolled out to other food sub sectors.

National Centres of Training Excellence

In order to translate R&D findings into practical training programmes, national centres of training excellence further developed. Such centres would operate at the nexus of applied research/knowledge transfer/training.

Recommendation XX

National Centres of Training Excellence should be developed for meat, dairy, consumer foods and biotechnology, building on current funding supports and the existing training and research centres such as Moorepark (dairy research and training); the National Food Centre (meat/consumer foods research and training) and the UCC Food Training Centre and Food Service Technology Faculty (food biotech research and training).

These centres should work with Enterprise Ireland in the area of commercialisation of the results of the research.

5. Policy and Training Infrastructure Initiatives – Rationale

There is a wide variety of Government departments and state agencies involved in the development of policy and in the funding and provision of training and training support to the Irish food processing sector. These include the Department of Enterprise, Trade and Employment, the Department of Agriculture, Food and Rural Development, Enterprise Ireland, FÁS, and Teagasc. Over time, a certain amount of confusion has emerged about their respective roles and responsibilities, particularly those of EI and FÁS. Accordingly, a key recommendation is targeted at clarifying these roles and then communicating what they are clearly to the food sector.

Complementing this, it is recommended that a national, centralised source of all accredited education and training information be established. This should help to eliminate some confusion and facilitate greater user-friendliness among food companies.

It is also recommended that an induction qualification for all new employees in the food sector be developed. This should facilitate better staff induction and higher food hygiene and safety standards.

In response to concerns raised by industry, a review of the qualification criteria and application processes involved in company grant aid schemes for HRD is recommended.

STATE SUPPORT/TRAINING INFRASTRUCTURE

Client Communications Campaign

The companies survey and workshop identified a need for clarification and communication of the roles and supports available to companies from Irish state agencies.

Recommendation XXI

The roles of the state agencies involved in training and company development need to be more clearly defined, in particular those of FÁS and Enterprise Ireland. Following from this, a focused trade communication campaign should be undertaken, to outline the roles of the various state agencies in this area and to explain various training/HRD supports available to companies.

Further Development of FÁS/EI Executives on Skills Assessment

In light of the drivers-of-change identified in this report and likely effects on skills needs, there is a corresponding need to:

- (a) enhance the ability of EI/FÁS Advisers to identify and assess changing training needs; and
- (b) improve their capability to assess strategic HRD activities.

Recommendation XXII

Within the context of the significant drivers-of-change, FÁS executives and Enterprise Ireland's Development Advisors should undergo a focused, specific training programme on identifying skills weaknesses and assessing training needs.

National Centralised Database

There are currently information deficits on available accredited trainers and training in particular. Accordingly, the development of a centralised information source/library, including website/library of all education and training information is required.

Recommendation XXIII

A national, centralised data source of all accredited education and training information, including both accredited trainers and training programmes, should be established by FÁS and Enterprise Ireland, in consultation with Teagasc.

Food Industry Induction

IBEC, in conjunction with FÁS, the FSAI and Enterprise Ireland, should initiate efforts to ensure that all new employees undertake a short, formal induction programme, specifically for the food sector.

Recommendation XXIV

An induction qualification for the food industry should be introduced, to cover such areas as employee health and safety in the workplace, food safety, hygiene, basic numeracy, etc.

Expansion of Skillnets

The Skillnets initiative can facilitate a further reduction of some of the key barriers to training, specifically cost and much improved relevance of such tailored programmes.

Recommendation XXV

The Department of Enterprise, Trade and Employment should undertake that:

- (a) The Skillnets initiative, which it is considered a good example of a practical, company-focused solution to training needs, should be further expanded and promoted;**
- (b) Better communication and promotion of the initiative to industry should also be undertaken.**

Evaluation of In-Service Training

Evaluation and adjustment of in-service training programmes provided, using State grants, to ensure that they can better serve industry and participant needs, is required. The evaluation should include participant feedback.

Recommendation XXVI

Formal evaluation and publication of the effectiveness, relevance and quality of in-service training programmes provided using state grants, should be undertaken by FÁS and Enterprise Ireland, in conjunction with IBEC.

Review of HRD Grant Procedures

On the basis of the industry survey and workshop there is a need to:

- (a) Review the relevance of existing HRD qualifying criteria, which may no longer be relevant to the food industry; and
- (b) Address the industry view of perceived excessive bureaucracy involved.

This will be undertaken in the context of current industrial policy and legislation.

Recommendation XXVII

Enterprise Ireland should review the qualification criteria and application processes involved in its grant aid for HRD, with a view to both ensuring their relevance to the sector and streamlining of the application process.

9.3 Conclusion

There is a substantial amount of work to be undertaken over the medium term if the recommended training initiatives for the Irish food processing sector are to be implemented. These will, however, build on the significant training services that are presently available.

The recommendations span five areas:

- Employer focused initiatives
- Employee focused initiatives
- Third Level education
- Training
- State/Training infrastructure.

There is a particular responsibility on the part of employers to commit to, and lead, many of these initiatives. Without strong support from senior management, the training required to respond to the increasingly competitive environment simply will not happen. A better partnership approach between employers and employees is also needed.

The existing expertise of education and training providers, together with the state training infrastructure, must be further developed so that they are equipped to address the drivers-of-change affecting the food industry and noting evolving company requirements. The research undertaken for this study suggests that such service providers have to become more company-focused and responsive in terms of providing training solutions.

The skills and commitment of management and staff are one of the critical success factors for the Irish food industry. Accordingly, the strategic development of this essential resource has to become a higher priority for the food sector. This should be reflected in an intensified commitment to, and investment in, training and staff development over the medium term.

Appendix 1.1

Reports Published by the Expert Group on Future Skills Needs

Report	Date of Publication
<i>The First Report of the Expert Group on Future Skills Needs Responding to Ireland's Growing Skills Needs</i>	December 1998
<i>Business Education and Training Partnership Report on the Inaugural Forum, Royal Hospital Kilmainham</i>	March 1999
<i>The Second Report of the Expert Group on Future Skills Needs Responding to Ireland's Growing Skills Needs</i>	March 2000
<i>Business Education and Training Partnership 2nd Forum, Dublin</i>	March 2000
<i>Report on E-Business Skills</i>	August 2000
<i>Report on In-Company Training</i>	August 2000
<i>Benchmarking Mechanisms and Strategies to Attract Researchers to Ireland</i>	July 2001
<i>The Third Report of the Expert Group on Future Skills Needs Responding to Ireland's Growing Skills Needs</i>	August 2001
<i>Labour Participation Rates of the over 55s in Ireland</i>	December 2001
<i>National Survey of Vacancies in the Private Non-Agricultural Sector 2001/2002</i>	March 2003
<i>National Survey of Vacancies in the Public Sector 2001/2002</i>	March 2003

Appendix 2.1

Expert Group on Future Skills Needs - List of Members

Member	Organisation
Dr Danny O'Hare (<i>Chairperson</i>)	President Emeritus, Dublin City University
David Barry	Department of Enterprise Trade and Employment
Enda Connolly	IDA Ireland
Brian Cogan	Forfás
Roger Fox	FÁS
Jack Golden	Cement Roadstone Holdings/Institution of Engineers of Ireland (CRH/IEI)
Una Halligan	Hewlett Packard
John Hayden	Higher Education Authority (HEA)
David Lowe	Goodbody Stockbrokers
Joe McCarthy	Arkaon
Kevin McCarthy	Department of Education & Science
Dr Sean McDonagh	Skills Initiative Unit
Eugene O'Sullivan	Department of Finance
Peter Rigney	Irish Congress of Trade Unions
Dr Catherine Kavanagh	Forfás
Aisling Penrose (<i>Secretary</i>)	Forfás

Appendix 3.1

Food Processing Study - Steering Group List of Members

Name	Organisation
Kay Hallahan (Chairperson)	Forfás
Martine Brennan	FSAI
Derek Breen	Enterprise Ireland
Sean Faulkner	Enterprise Ireland
Tara McCarthy	Bord Bia
Pat Moynihan	FÁS
John McGrath	FÁS
Dr Tony Smith	Dept. of Agriculture, Food and Rural Development
Declan Fennell	Bord Glas
David Barry	Department of Enterprise, Trade and Employment
Mary McCarthy Buckley	UCC
Con Lucey	IFA
Dr Catherine Stanton	Teagasc
Seamus O'Donoghue	ICOS
Mary Ena Walsh	CERT
Andrea Wood	IBEC
Pat Daly	National Food Centre, Teagasc

Appendix 4.1

Extract from The Ministerial Task Force on Training & Employment in the Irish Seafood Industry Report 2001

4.1 Fish Processing Sector

4.1.1 Background

The scope of this chapter on the Irish fish processing sector includes the interaction of fish processing with seafood wholesaling, distribution and retailing. Seafood processing provides employment for 4,500 full-time and seasonal workers in 135 main fish processing units. An additional 750 personnel are engaged in about 70 smaller firms in the wholesale, distribution and retail sector of the home market. The processing industry comprises a number of distinct product category operations with typical employment ranges as follows.

Table 4.1.1: Employment in Irish Fish Processing Companies

	Range of Employees per Firm		
	Number of Firms	Full-time	Seasonal
Pelagic Processors (Herring, mackerel, etc.)	29	10-60	15-120
White Fish	65	5-50 (1x100)	2-15
Shellfish	30	10-75	5-40
Smoked Fish (esp. Salmon)	57	3-35	3-40
Total: 135 Main Processing Companies			

Source: BIM 1999.

There is a large degree of overlap in the above categories of plants with many multi-species factories.

Increasingly in recent years the processing sector, along with the seafood wholesale, distribution and retail sub-sectors, has experienced extreme difficulty in recruiting and retaining staff because of the predominantly seasonal nature of employment and more attractive employment opportunities on offer elsewhere in the expanding national economy. Seasonal work in pelagic processing generally has decreased due to decreased local landings of mackerel, reduction in the processing of marinated herring and the introduction of labour saving technology in this area.

Shortage of white fish for fresh fish trading on the home market has resulted in less full-time employment which has been offset to some extent by added value white fish processing. Employment in shellfish processing has grown while growth in salmon processing and smoking slowed in the late nineties as most plants are now using automated slicing and packaging equipment. Employment in the seafood processing industry in 1999 is summarised below.

Table 4.1.2: Employment in the Fish Processing Sector 1999

	Full-time	Part-time	Total	Full-time equivalent*
Processing	2,308	2,222	4,530	3,050

Note: * The full time equivalent figure counts a part-time job in the processing sector as 0.33 a full-time job.

Source: BIM Employment Survey 1999.

The overall employment trend over the coming years will be enhanced by increased investment in the processing sector projected for the period of the National Development Plan 2000-2006.

4.1.2 National Development Plan 2000-2006

The prime objectives of BIM's Integrated Plan for the Irish Seafood Industry, the training policy document developed under the National Development Plan 2000-2006, is to expand the skills base and increase the availability of trained workers in the seafood industry. The training envisaged will encompass measures to achieve clear career progression in the processing sector as well as the catching and aquaculture sectors. The total indicative allocation under the Plan is £10 million (€12.7 million).

The National Development Plan also provides support for seafood processing development of £25 million (€32 million), with £6 (€8 million) for marketing and allows for access to additional R & D funding. The key objectives will be to optimise the added value content of processed fish production and to assist the industry to improve its efficiency and competitiveness on international markets.

With the prospect of increased raw material supplies becoming available from the aquaculture industry, processing from this source is likely to give the best opportunities for employment growth compared to traditional species. Improved efficiency and the increasing introduction of new technology necessary for competitiveness in the market place will undoubtedly have a significant effect on the rate of growth of employment throughout the processing sector generally.

4.1.3 Training Needs and Skills Analysis of the Processing/Retail Sector

The main findings of a European Social Fund report entitled, Evaluation Report – Training for the Fisheries Industry, published by the Evaluation Unit in February 1997 were that:

- Serious gaps existed in training provision for those working in and supplying the processing sector;
- More co-ordination between various agencies involved in providing training was necessary;
- A system of Skills Certification for operatives should be implemented.

BIM, in co-operation mainly with FÁS, has co-ordinated the organisation and delivery of training courses, primarily for the processing sector in response to industry demand for many years. This working relationship of BIM, FÁS and Enterprise Ireland will continue for the benefit of the Irish seafood industry.

The enforcement of increasingly stringent national and EU Regulations by the Food Safety Authority will generate an increased demand for training to meet statutory food safety requirements. However, the seafood processing, wholesale, distribution and retail sector has never had a nationally recognised progressive framework of training programmes at operative level similar to those available in the catching and aquaculture sectors.

The BIM Training Needs and Skills Analysis Survey (1999) attempted to quantify the training needs and skills requirements of the fish processing and retail sector. A total of 26 processors representing 19% of the sector and 3 multiples were surveyed throughout Ireland. The results showed that recruitment of fish filleters is the most notable area where the staffing need and the anticipated difficulty in hiring and training of personnel has been highlighted as common to both processors and retailers. Fish processors also indicated a significant need for supervisors and other skilled personnel and the difficulty in recruiting and in retaining general operatives was also seen as a major problem for the sector.

Whereas respondents in the processing sector believed that recruitment would be most difficult for skilled personnel, they also anticipate difficulty in recruiting unskilled and semi-skilled workers. In the Retail/Distribution sector, the strongest labour demand is for the preparation of fish, including filleters and counter display staff. Lack of skilled staff has been recently cited by a leading multiple retailer as the reason for the closure of fresh fish counters at a large number of its stores.

The BIM survey found that, in spite of a lack of a structured training programme for the fish processing and retail sectors, attitudes overall towards training were very positive. Although 55% of respondents (mainly processors) had difficulties in accessing training, a significant majority (93%) offered support to staff in the form of paid time off or payment of course fees. Above all, the survey highlighted the crucial demand for core practical skills required in processing and retailing operations such as filleting. The general problem, however, of obtaining and retaining staff in any job category was of major concern to all respondents.

4.1.4 Labour and Skills Shortages

There are now skills and general labour shortages in all categories of fish processing and retail operations, with the situation becoming more acute. This is due to the generally positive jobs climate, with more attractive employment opportunities than fish processing being readily available. Recognising this, BIM has recently produced a brochure entitled “The Recruitment of Fishing Industry Workers from Non-European Economic Area Countries”. Some processing firms are sourcing personnel from Spain, Portugal, the UK and Finland and also from East European countries such as Poland, Slovakia and Latvia.

Apart from the continuous need for general operatives in all areas, more specialist skill shortages also exist in respect of the following:

- Hand Filleters – acute for all species
- Filleting machine fitters
- Prawn graders/packers
- Salmon slicing and packaging operatives
- Herring roe extraction operatives
- Refrigeration operatives
- Van salesmen/drivers
- Sales and sales administration persons.

The BIM Training Needs and Skills Analysis referred to above, and detailed in the Appendix to the report to The Ministerial Task Force, highlights the level of shortage in the various skill areas. The view of the consultants appointed by the Task Force to complete a demographic study (also outlined in the Task Force Report) suggesting a total current need for an additional 983 persons, is considered a realistic assessment of the current situation. Due to the seasonal nature of some sub-sectors of the processing industry, the need for additional staff can vary in both numbers and skills required. There is a particularly urgent need for trainers in skills such as filleting.

4.1.5 Training Courses and Facilities

As in other manufacturing and service sectors, fish processors were, up until recently, eligible to avail of the FÁS Services to Industry programmes. The funding of training support for industry is now provided by Enterprise Ireland. The details of the administration of the new service in respect of food processing are currently being finalised by Enterprise Ireland and were therefore unavailable to the Task Force for comment.

Up to recent years, the processing sector had been slow to appreciate the benefits that training programmes can contribute to the overall success of their businesses. However, a noticeable improvement has been obvious over the past 5 years, e.g. participation in management training at IMI, FÁS/NUI Cork Corporate Direction Programme, FÁS certified hygiene training, and specialist fish processing related courses in the UK and Germany. In the past year, over 20 engineering staff travelled to Germany, with support from FÁS, to participate in 2 one-week training courses in the operation and maintenance of fish filleting machines.

There is no specific training centre for the fish processing industry in Ireland, but during the period 1994-99 an invaluable range of services have been available. FÁS provided grant assistance under its Training Support Programme, which is 50% of actual training costs, and up to 65% in some cases. As referred to above, funding responsibility has now been transferred to Enterprise Ireland and it is assumed that a similar approach to that of FÁS will be followed. There is also difficulty in finding suitable instructors, with a practical hands-on approach and with knowledge of market needs, particularly in fish filleting, smoking, etc.

The Task Force noted that there are a number of State agencies, colleges, consultancy firms and individuals offering services to the fish processing sector. The Task Force considered that there is an adequate supply of courses in areas such as hygiene, quality control and HACCP (Hazard Analysis and Critical Control Points), but noted that not all are developed to a recognised national standard. With the large number of firms in the sector, compared to other areas of food manufacturing, training in fish processing is seen as having good income potential. However, industry representatives on the Task Force repeatedly stressed that not only is there a shortfall in core specialist seafood handling practical skills, but there is even a more serious lack of suitably experienced instructors to teach these essential skills, e.g. in fish filleting.

4.1.6 Management Development

The need to develop competent seafood processing managers is not being fully addressed. As most fish processing establishments have evolved from small local family businesses the formal training of management has often been limited. Too many plants over rely on one or two owner/managers for the full range of management activity. This may be one of the reasons that there has been, in the past, a lack of appreciation for training support services in the industry. However, this attitude is changing and industry leaders are now more aware of the benefits of training for their business.

This has been borne out by the interest generated in Donegal resulting from the FÁS activity there, commencing with the FÁS Certificate in Food Hygiene course attended by 16 managers from the processing sector and where over 400 general operatives have received the FÁS Certificate in Foundation Food Hygiene. FÁS, the Department of the Marine & Natural Resources and BIM followed this with programmes in HACCP (Hazard Analysis and Critical Control Points) delivered by the National Food Centre and private consultants. Interest is also developing in production management and the development of general supervisory skills for improving efficiency and competitiveness. FÁS has developed a range of programmes for the food industry, some of which are specifically aimed at smaller firms such as those in the fish processing sector.

The priorities in management development/training can be summarised as follows:

- Production management
- Quality management
- Product safety (HACCP)
- Sales/marketing/IT
- Research and development
- Financial.

4.1.7 *Human Resource Development for the Future*

4.1.7.1 **General Objectives**

- Develop national occupational standards and a certification system along the lines of the FÁS meat industry training initiative, as proposed in BIM's Integrated Training Plan for the Irish Seafood Industry 2000-2006.
- Identify core/specialist skills and standards for key processing sector occupations.
- Benchmark these against best international practice.
- Develop national training curricula, which will allow for upward mobility of workers within the sector.
- Provide a career progression path for workers.
- Improve working conditions and employee morale.

4.1.7.2 **Management Development**

- General corporate development for senior management.
- Management practice for middle managers in production, marketing and financial control.
- Development of professional and technical skills – food technology, QC, HACCP, etc.
- Training in product and process R&D.

4.1.8 *Recommendations*

As many of the Task Force recommendations will have to be addressed by State Agencies, which have relevant input into the sector, it is envisaged that BIM and FÁS, with financial support from Enterprise Ireland and/or Údaras na Gaeltachta as appropriate, will play the lead role in the development of training curricula and programmes and their delivery as appropriate. The valuable role of Teagasc, the National Food Centre in the design and delivery of specialist training programmes, particularly in food safety, will also be essential to the attainment of the objectives. There is also an important role for the Universities, the Institutes of Technology and management training consultancies in the delivery of specific programmes. The support and valuable contribution of the Trade Unions involved in the sector is also important for the successful implementation of the recommendations.

4.1.8.1 **Recommendations pertaining to Employment**

- Labour saving technology should be introduced to improve the overall efficiency and viability of seafood processing operations.
- As the labour shortage becomes more acute, the Government should simplify Work Permit procedures as far as possible to facilitate a structured intake of overseas workers and assist in providing them with induction training.
- Working conditions should be improved by maintaining the highest safety standards and adopting environmentally friendly practices such as minimising water usage and waste creation.
- Human resource development training programmes as outlined below.

4.1.8.2 **Recommendations pertaining to Training**

- FÁS, Enterprise Ireland and BIM should collaborate in preparing relevant standards and curricula to meet skills needs and create career progression paths for fish processing operatives in co-operation with relevant industry representative organisations.
- A FÁS National Certificate for seafood processing workers should be developed and adopted, similar to the meat industry model referred to above, as proposed in BIM's Integrated Training Plan for the Irish Seafood Industry 2000-2006.

- A National Certificate modular training course should be introduced for small processing companies and those engaged in seafood wholesale, distribution and retailing.
- A pool of trainers should be developed in key specialist areas of fish handling and processing, and in particular for the in-plant implementation of HACCP (Food Safety) and Food Quality Systems throughout the sector.
- Suitably experienced trainers should be assisted by State agencies to develop effective methods of training delivery techniques to meet industry objectives, including in-plant training.
- Programmes of management capability development should be organised in areas such as:
 - General and operational management
 - Research and Technical Development (RTD), especially relevant to adding value and improved efficiency
 - Information Technology
 - Quality improvement
 - Production management/Supervisory development.
- The development of BIM's in-house training facilities should be continued, e.g. laboratory training of quality control and other key personnel from industry.
- BIM's information and advisory services to the processing, distribution and retail sector by way of training manuals, leaflets, posters, etc. should be upgraded. Special mention is made in this connection of the excellent BIM Seafood Handbook recently launched by the Minister for the Marine & Natural Resources. This handbook is intended as a set of guidelines for the retail trade especially for the induction of new personnel and should form the basis of a retail skills module in the proposed national Certificate.
- An induction module in Fish Technology on the lines of the former Torry Research Station course in Aberdeen should be developed for new production, quality control, marketing and development specialists from the Irish seafood and aquaculture sectors to raise the technical base of the industry.

Overall Summary of Task Force Seafood Processing Sector Recommendations

1. Labour saving technology should be introduced to improve the overall efficiency and viability of seafood processing operations.
2. The Government should simplify Work Permit procedures as far as possible to facilitate a structured intake of overseas workers and assist in providing them with induction training.
3. Working conditions should be improved by maintaining the highest safety standards and adopting environmentally friendly practices such as minimising water usage and waste creation.
4. FÁS, Enterprise Ireland and BIM should collaborate in preparing relevant standards and curricula to meet skills needs and create career progression paths for fish processing operatives in co-operation with relevant industry representative organisations.
5. A FÁS National Certificate for seafood processing workers should be developed and adopted similar to the meat industry model, as proposed in BIM's Integrated Training Plan for the Irish Seafood Industry 2000-2006.
6. A National Certificate modular training course should be introduced for small processing companies and those engaged in seafood wholesale, distribution and retailing.

7. A pool of trainers should be developed in key specialist areas of fish handling and processing, and in particular for the in-plant implementation of HACCP (Food Safety) and Food Quality Systems throughout the sector.
8. Suitably experienced trainers should be assisted by State Agencies to develop effective methods of training delivery to meet industry objectives, including in-plant training.
9. Programmes of management capability development should be organised in the areas identified in paragraph 3.3.8.2 of this report.
10. The development of BIM's in-house training facilities should be continued, e.g. laboratory training of quality control and other key personnel from industry.
11. BIM's information and advisory services to the processing, retail and distribution sector should be upgraded.
12. BIM's Seafood Handbook should form the basis of a retail skills module in the proposed national standard Certificate.
13. An induction module in Fish Technology on the lines of the former Torry Research Station course in Aberdeen should be developed for new production, quality control, marketing and development specialists from the Irish seafood and aquaculture sectors, to raise the technical base of the industry.

Appendix 5.1

Profile of Food-Related Undergraduate Courses Provided by Third Level Institutions in Ireland

Contents

NUI, Cork	Food Business (degree)	126
	Food Science (degree)	127
	Food Technology (degree)	128
	Nutritional Science (degree)	129
NUI, Dublin	Agriculture & Environmental Science (degree)	130
	Food Science (degree)	131
	Engineering Technology (degree)	132
	Agricultural & Food Engineering (degree)	133
NUI, Galway	Biotechnology (degree)	134
	Marine Science (degree)	135
NUI, Limerick	Food Technology (degree)	136
NUI, Maynooth	Biotechnology (degree)	137
DCU, Dublin	Biotechnology (degree)	138
DIT, Cathal Brugha St.	Food Technology (degree)	139
DIT, Kevin St.	Applied Science (degree)	140
	Applied Science (diploma)	141
IT, Waterford	Agriculture Science (cert)	142
	Horticulture (diploma)	143
IT, Sligo	Food Science (cert)	144
IT, Letterkenny	Food Science (diploma)	145
IT, Galway/Mayo	Aquaculture (cert)	146
IT, Dundalk	Food Science (cert)	147
IT, Blanchardstown	Horticulture (diploma)	148
Queens, Belfast	Food & Nutrition (BSc)	149
	Food Science (BSc)	150
	Agriculture (BAgr)	151
	Agriculture Science (BSc/BAgr)	152
	Agriculture Technology (BSc)	153
Loughry College	Food Technology (BSc)	154
	Food Technology (diploma)	155
	Food Science (diploma)	156

<i>College: NUI, Cork</i>	<i>Number of Graduates</i>
<i>Course: Food Business</i>	<i>2001: 34</i>
<i>Qualification: BSc</i>	<i>2000: 37</i>
<i>Duration: 4yrs</i>	<i>1999: 35</i>

Course Description

- The course is designed to combine business and marketing skills with a knowledge of food products and processing.
- Specialised courses in Food Business are studied throughout the duration of the degree programme.
- This is combined with Accounting, Economics, Marketing and Management Information Systems.
- Food Engineering and Technology are studied over the four years.
- Basic Food Chemistry is presented in the first two years followed by Nutrition in fourth year.
- Students do a six-month work placement in third year with a group project in fourth year.
- Graduates are prepared to play a leading role in the management of a market driven food industry in Europe.
- Food Business students have been extremely successful in the Enterprise Ireland Student Enterprise Awards.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
● Food Economics	● Food Economics	● Food Marketing	● Food Economics
● Food Marketing	● Management Information Systems	● Food Business Management	● Food Marketing
● Accounting	● German or Spanish	● Food Technology	● Management
● Food Chemistry	● Food Microbiology	● Six month work placement	● Selection of options from:
● Food Business	● Statistics	● Management	– Food Engineering
● Economics	● Food Chemistry	● Accounting	– Food Technology
● German and Spanish	● Food Production	● Food Engineering	– Food Economics
● Food Engineering			● Food Management
			● Nutrition
			● Food Technology
			● Group project on the development of a full scale Food Business

Graduate Prospects

- Graduates are qualified to pursue careers as sales and marketing managers in food manufacturing enterprises such as:
 - Dairy and meat
 - Poultry and fish
 - Cereal grain product
 - Others.

College: NUI, Cork

Course: Food Science

Qualification: BSc

Duration: 4yrs

Number of Graduates

2001: 34

2000: 35

1999: 38

Course Description

- Course combines an in-depth study of Food Chemistry and Food Microbiology with Nutrition, Food Engineering, and Food Technology.
- Courses in Food Chemistry provide the student with a knowledge of the chemistry and stability of food constituents, their identification and qualification. It covers the general principles of a wide range of foods and more detailed treatment of the principle food groups.
- Courses in Food Microbiology teach the student the basic principles of microbiology and how microorganisms can affect, both positively and negatively, food production.
- Students do a six month work placement in third year and a research project in fourth year.

Subjects in Full

Year 1

- Biology
- Mathematical Methods
- Food Science
- Chemistry
- Physics

Year 2

- Biochemistry
- Microbiology
- Food Engineering
- Food Chemistry
- Nutrition
- Statistics

Year 3

- Food Chemistry
- Nutrition
- Six month industrial work placements
- Food Microbiology
- Food Technology

Year 4

- Either Food Chemistry or Food Microbiology research project

Graduate Prospects

- Graduates are qualified to take on roles at management technical level in their specialised area.
- Opportunities also exist in areas such as food product and research, quality control and marketing and sales.

<i>College: NUI, Cork</i>	<i>Number of Graduates</i>
<i>Course: Food Technology</i>	<i>2001: 32</i>
<i>Qualification: BSc</i>	<i>2000: 31</i>
<i>Duration: 4yrs</i>	<i>1999: 29</i>

Course Description

- This course aims to provide the graduate with skills in Chemistry, Microbiology, Nutrition, Engineering and Business.
- In first year the student studies basic science and an introduction to Food Science; in second year there are Food Technology, Food Chemistry, Food Engineering, Microbiology and Nutrition modules.
- Third year involves courses in Food Technology and general business courses.
- Fourth year focuses on detailed studies of dairy and meat processing, food ingredients, cereal technology, convenience foods, food packaging and product development.
- Third year students undertake a six month work placement.
- Fourth year students undertake a detailed project in which a novel food product is developed.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> • Biology • Mathematical Methods • Introductory Food Science • Chemistry • Physics 	<ul style="list-style-type: none"> • Food Technology • Food Engineering • Nutrition • Food Chemistry • Food Microbiology 	<ul style="list-style-type: none"> • Food Technology • Unit courses in: <ul style="list-style-type: none"> - Management - Food Production - Food Economics - Accounting - Nutrition - Communication Studies • Six month work placements 	<ul style="list-style-type: none"> • Food Technology Commutated Studies. One of the following: <ul style="list-style-type: none"> - Food Business Group (Applied Computing and Strategic Management) or - Food Science Group A (Food Microbiology) or - Food Science Group B (Food Chemistry) • Research project

Graduate Prospects

- Graduates are qualified to pursue careers at management and technical level in both the domestic and international food industry.
- Positions also available in process and food product research, marketing and technical sales and analysis.

College: NUI, Cork

Course: Nutritional Sciences

Qualification: BSc

Duration: 4 years

Number of Graduates

2001: 39

2000: 23

1999: 27

Course Description

- Its objective is to provide graduates with expertise in human nutritional science, coupled with Food Science and Technology.
- The course prepares graduates for careers in R&D, Quality Assurance, consumer education in food and health care industries.
- First and second year study a broad science base with third and fourth year study in detail basic aspects of human nutrition.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none">• Biology• Chemistry• Mathematical Methods• Physics• Applied Psychology• Nutrition	<ul style="list-style-type: none">• Nutrition• Biochemistry• Microbiology• Psychology• Food Chemistry	<ul style="list-style-type: none">• Nutrition• Food Chemistry• Food Microbiology• Food Toxmology• Communication Studies• Work Placement	<ul style="list-style-type: none">• Nutrition• Food Technology• Pharmacology• Food Microbiology• Communication Studies• Research Projects

Graduate Prospects

- Graduates will be able to pursue careers in the food and health care sectors, and in food processing industries at management technical level.
- Opportunities are also available in public health, quality control and technical sales.

<i>College: NUI, Dublin</i>	<i>Number of Graduates</i>
<i>Course: Agricultural & Environmental Science</i>	<i>2001: 197</i>
<i>Qualification: BSc</i>	<i>2000: 199</i>
<i>Duration: 4 yrs</i>	<i>1999: 176</i>

Course Description

- This courses focuses on the interaction between various forms of land use and the natural environment.
- After a general first year, second year involves study relevant applied to agricultural and environmental sciences.
- The third and fourth year courses include Zoology, Biotechnology, Plant Disease and Molecular Biology.
- Fourth year subjects include Environmental Impact Assessment, Environmental Management and Soil & Water Management.
- Students participate in a one-week residential field course on Ecology and Environmental Management in second year.
- Practical work in Agricultural and Environmental Management is undertaken in third year.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> • Agricultural Economics • Chemistry • Agricultural Science • Mathematics • Biology • Introduction to Computing • Experimental Physics 	<ul style="list-style-type: none"> • Plant Physiology • Impact of man on the environment • Applied Zoology I • Genetics I • Applied Plant Biology • Statistics • Crop Husbandry II – Surveying • Agricultural Climatology and Meteorology • Agricultural Chemistry I • Agricultural Chemistry II • Geology • Agricultural Microbiology • Soil Science 	<ul style="list-style-type: none"> • Plant Pathology – Agrichemical and Plants • Applied Zoology II – Diversity in Rural Landscape • Fundamentals of Biotechnology – Animal Husbandry II • Experimental Design – Soil Science II • Literature Review Project – Work Placement 	<p>Choose 4 of the following 5:</p> <ul style="list-style-type: none"> – Wildlife Management – Epidemiology and Zoonoses – Pest Management – Plant Disease Management – Molecular Biology and the Environment • Environment Impact Assessment • Environmental Management • Soil and Water Management • Project

Graduate Prospects

- Likely areas of employment are in research, education and advisory work.
- Many graduates gain employment with state and local Government agencies, co-operatives and other agribusiness enterprises.
- Rural environmental management and wildlife and natural resource management represent further employment opportunities.

College: NUI, Dublin

Course: Food Science

Qualification: BSc

Duration: 4 yrs

Number of Graduates

2001: 12

2000: 5

1999: 16

Course Description

- Students gain a scientific understanding of how the food chain functions from production to processing and ultimately to the marketing of food products.
- In first year a general course in various sciences is followed, with second year concentrating in detail on areas such as Food Physics and Analysis and the husbandry aspects of Food Production.
- Third year takes a more applied approach with emphasis on Nutrition, Food Chemistry, Food Microbiology, Biochemistry and Analytical Techniques, with fourth year concentrating on Food Ingredients, Nutrition and Marketing.
- Students participate in a ten week work placement in 3rd year with a substantial research project being completed in final year.

Subjects in Full

Year 1

- Agricultural Economics
- Chemistry
- Agricultural Science
- Mathematics
- Biology
- Introduction to Computing
- Experimental Physics

Year 2

- Agribusiness
- Statistics
- Principles of Engineering II
- Agricultural Microbiology
- Agricultural Chemistry I
- European Language
- Agricultural and Environmental Biology
- Crop Husbandry II
- Food Science I: Food Physics
- Food Science II: Basic Analysis
- Agricultural Chemistry II

Year 3

- Food Engineering principles
- Biochemistry I and II
- Nutrition II
- Work placement
- Food Analysis
- Food Chemistry
- Experimental Design
- Computer Applications

Year 4

- Food Manufacturing systems
- Marketing
- Food Ingredients
- Dairy Products
- Sensory Analysis
- Food Process Technology
- Nutrition II
- Fresh and processed meat products II
- Cereal Chemistry and Brewing
- Project

Graduate Prospects

- Close to 100% of all Food Science graduates are employed within a year of graduation.
- Most popular areas of employment include production management, food quality, food safety, research and development, sales, marketing and process technology.

College: NUI, Dublin

Course: Engineering Technology

Qualification: BAgrSc

Duration: 4 yrs

Number of Graduates

2001: 8

2000: 18

1999: 11

Course Description

- This course involves the study of the application of engineering technology in the food and agri-industries. The curriculum involves a substantial focus on agribusiness courses.
- First and second year study involve general science and engineering courses.
- The third and fourth year programme cover agribusiness, information technology and electives, allowing the student to develop individual subject specialisations.
- Professional work experience is carried out in third year which is then linked to a major research project in fourth year. This project is linked to an industrial partner and the student's work experience.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> • Agricultural Economics • Chemistry • Agricultural Science • Mathematics • Biology • Introduction to Computing • Experimental Physics 	<ul style="list-style-type: none"> • Agribusiness • Statistics • Surveying • Principles of Engineering I, II and III • Computer and Manufacturing Technology • Food Science and Technology • Agricultural Microbiology • Agricultural & Environmental Biology • Crop Husbandry II • Literature research project • Soil Science I 	<ul style="list-style-type: none"> • Financial Planning and Control • Animal Husbandry • Power and Machinery I • Computer Information Systems and Programming • Major Project I • Electives • Food Engineering Principles • Structural and Soil Engineering • Remote Sensing and GIS 	<ul style="list-style-type: none"> • Buildings & Environment • Food Manufacturing Systems • Environmental Engineering • Major Project II (includes professional work placement) • Electives • Food process Engineering • Power and Machinery II

Graduate Prospects

- Employment is mainly found in the food and agri-industries.
- Employment opportunities include production, manufacturing, equipment selection and maintenance, computer technology, environmental engineering, energy utilisation, technical sales and management.

College: NUI, Dublin

Course: Agricultural and Food Engineering

Qualification: BEng

Duration: 4 yrs

Number of Graduates

2001: 10

2000: 15

1999: 19

Course Description

- The objective of this course is to equip students with the analytical skills that are required for careers in the Agri-food and related industries, both nationally and internationally.
- The course aims to provide students with a detailed knowledge of existing and new technologies that exist in this field.
- The course emphasises three main areas:
 - Biological and Food Process Engineering
 - Environmental and Bio source Engineering
 - Precision Agriculture and Information Technology.
- Students take a language course in first year. Languages include French, German, Spanish and Japanese.
- Languages can be taken as an option in third or fourth year.
- Students may pursue their third year studies in Virginia Tech University, one of America's top 20 engineering universities.
- In addition students may spend up to a year at selected European universities in accordance with the Socrates programme.
- Students undertake a major research project in third year.

Subjects in Full

Year 1

- Mathematics
- Chemistry
- Computer Science
- Electronic & Electrical Engineering
- Engineering and Fluid Mechanics
- Engineering Thermodynamics
- Introduction to Agricultural and Food Engineering
- Experimental Physics
- Mathematical Physics
- Engineering Graphics
- Languages

Year 2

- Food Science
- Thermodynamics
- Mechanics of Materials
- Electrical Engineering
- Introduction to Bio systems
- Computer Science Coursework
- Literature research project
- Applied Dynamics
- Mechanic of Fluids
- Electronic Engineering
- Mathematics

Year 3

- Power & Machinery 1
- Process Engineering Principles

- Engineering Competition
- Mathematics (Mod A)
- Crop Husbandry and Animal Husbandry
- Design project
- Thermodynamics
- Structural and Soil Engineering
- Mathematics (Mod B)

Year 4

- Food Process Engineering – Food Manufacturing Systems
- Buildings and Environment
- Power and Machinery II

- Food Manufacturing Systems
- Environmental Engineering
- Two electives from:
 - Management & its environment
 - Farm Management
 - Renewable Energy Systems
 - Surveying
 - Forest Engineering
 - Mathematics (A or B)
 - Environmental Policy Management
 - Managing Manufacturing Enterprise
 - Project

Graduate Prospects

- Graduates are candidates for global employment opportunities in areas such as food production and bio-processing, bio-processing equipment manufacturing and the environment.
- Graduates typically commence their careers in roles with a strong technological orientation, and over time, diversify into a wide range of fields.

<i>College: NUI, Galway</i>	<i>Number of Graduates</i>
<i>Course: Biotechnology</i>	<i>2001: 19</i>
<i>Qualification: BSc</i>	<i>2000: 18</i>
<i>Duration: 4 yrs</i>	<i>1999: 18</i>

Course Description

- Course aims to provide the student with an in depth knowledge of both the theoretical and practical applications of Biotechnology.
- Graduates are qualified to adapt to the new directions of Biotechnology including DNA-based Technology and Immunology.
- Students also are provided with an understanding of classic Biotechnology.
- The course also provides opportunity to study a European language in addition to a course in Business Studies.
- Both practical and literature-based projects are carried out.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> • Biology • Mathematics • Business Studies • Chemistry • Biotechnology • French or German 	<ul style="list-style-type: none"> • Chemistry • Microbiology • Biotechnology • French or German 	<ul style="list-style-type: none"> • Biotechnology • Microbiology • Applied Pharmacology and Toxicology • Biochemistry • Genetics 	<ul style="list-style-type: none"> • Genetic Engineering • Downstream Processing • Immunotechnology • Apoptosis • Environmental Pollution and Bioremediation • Project (practical and literature) <ul style="list-style-type: none"> - Diagnostics - Tissue Culture - Glycobiology - Biopharmaceuticals

Graduate Prospects

- Graduates find employment in a growing number of industries, including:
 - Albot Ireland Ltd.
 - Alltech
 - Allergad
 - Bayer and Omilever
 - Beckmad Instruments
 - CR Bord
 - Fort Dodge
 - Smithkline Beecham
 - National Diagnostics
 - Centre of Brokesearc Ireland.
- Graduates are also pursuing higher degrees (MS, PhD) in Biochemistry and Microbiology.
- Some graduates go on to further study abroad.

College: NUI, Galway

Course: Marine Science

Qualification: BSc

Duration: 4 years

Number of Graduates

2001: 11

2000: 14

1999: 14

Course Description

- The aim of this course is to provide the graduate with those specialist skills needed for Marine Science.
- Both the biological and physical/chemical aspects are studied.
- Another objectives of the course is to provide graduates with a broad range of disciplines to allow them to work outside of the Marine Science sector.
- First year covers a general introduction into science with second year introducing the student to Oceanography and the basics of Marine Science.
- Third and fourth year cover more advanced and specialised areas in this field.
- Fourth year students carry out a research project.
- There is a three month Socrates programme for students included in the course.

Subjects in Full

Year 1

- Biology
- Earth Science
- Chemistry/Physics
- Mathematics
- Applied Mathematics
- Mathematical Physics

- Applied Mathematical Science
- Zoology:
 - Invertebrate Zoology
 - Vertebrate Zoology

- Microbiology
 - Industrial and Environmental Microbiology
 - Molecular and Cell Microbiology
- Zoology

- Microbiology
- Marine Pollution and Enterprise
- Specialist Topic – chosen in accordance with research project (choose one), these are:

Year 2

- Fundamental Oceanography and Meteorology
- Geology 1 and 2
- Statistics
- Botany:
 - Biology of Algae and Fungi
 - Plant Growth and Development
- Microbiology:
 - Microbial Cells
 - Microbes and the Environment

Year 3

- Introduction to Marine Ecology:
 - Microbiology
 - Marine Biology
 - Biostatistics
 - Sensing and Sampling at Sea
- Chemical and Physical Oceanography
- Botany
 - Plant Ecology and Palaeobotany
 - Plant Utilisation and Biotechnology

Year 4 Optional

- Advanced Topic – choose 1 of 5:
 - 200 Plankton and Listeria
 - Ecophysiology of Marine Algae
 - Physical Oceanography
 - Deep Sea and Hydrothermal Vents
 - Marine Chemistry
 - Molecular Systematic and Molecular Ecology

- Marine Microfuel Process
- Marine Plant Source
- Chemical Oceanography
- Physical Oceanography
- Transferable Skills
 - First Aid
 - Safety at Sea
 - Computing Skills
 - Communication and Presentation Skills
 - Electronic Information Retrieval Skills

Graduate Prospects

- Graduates are well qualified to pursue careers in research or in the private/state marine industry.
- Other opportunities include fisheries, pollution and environment impact assessments and aquaculture.

<i>College: NUI, Limerick</i>	<i>Number of Graduates</i>
<i>Course: Food Technology</i>	<i>2001: 24</i>
<i>Qualification: BSc</i>	<i>2000: 29</i>
<i>Duration: 4 yrs</i>	<i>1999: 24</i>

Course Description

- This course is designed to prepare students to work in both scientific and management positions in the food industry both nationally and internationally.
- The programme covers key areas such as Food Science and Technology, Food Processing and Food Safety.
- The course also covers non-food uses of existing and new crops.
- An in-depth project is carried out in the final year.
- During the final semester of year three and the subsequent summer, students carry out work experience in a food enterprise.

Subjects in Full

<p>Year 1</p> <ul style="list-style-type: none"> • Mathematics 1 and 2 • General Physics • Computing 1 and 2 • Biology 1 and 2 • Physical Chemistry 1 • General Chemistry 1 • Inorganic Chemistry 1 • Organic Chemistry • Introductory Food Science and Technology <p>Year 2</p> <ul style="list-style-type: none"> • Mathematics 3 and 4 • Analytical Chemistry 1 and 2 	<ul style="list-style-type: none"> • Organic Chemistry 2 • Biochemistry 1 and 2 • Minobial Technology 1 • Food Technology 1 • Process Technology 1 • Choose one: <ul style="list-style-type: none"> - French - German - Personnel Management • Choose one: <ul style="list-style-type: none"> - French 2 - German 2 - Employee Relations/English/Science 	<p>Year 3</p> <ul style="list-style-type: none"> • Analytical Chemistry 3 • Minobial Technology 2 • Food Process Engineering 1 • Food Technology 2 • Chemometrics • Agribusiness 3 • Cooperative Education 1 and 2 <p>Year 4</p> <ul style="list-style-type: none"> • Food Ingredients • Food Technology 4 • Food Process Engineering 2 • Waste Management 1 	<ul style="list-style-type: none"> • Project • Choose one: <ul style="list-style-type: none"> - Fundamentals of Project Management - Energy Management - Food Technology 3 • Accounting or Non Business • Advanced Food Chemistry • Food Technology 5 • Food Microbiology • Project • Choose one: <ul style="list-style-type: none"> - Business Consulting - Food Technology
---	---	---	---

Graduate Prospects

- There are good employment prospects in:
 - Food Science
 - New Product Development
 - Process Development
 - Microbiology
 - Non Food Uses
 - Technical Management
 - Food Ingredients
 - Food Safety
 - Convenience Foods.
- The graduate is also well prepared for postgraduate research.

College: NUI, Maynooth

Course: Biotechnology

Qualification: BSc

Duration: 4 yrs

Number of Graduates

2001: 17

2000: 11

1999: 0

Course Description

- This course takes an applied approach to its teaching of Biotechnology.
- First year allows the student to build a broad base of understanding of a wide range of science disciplines.
- Second and third year covers the core subjects of Biotechnology. Students also get an opportunity to study more specialised areas, with lectures being supplemented by industrial visits to Biotechnology companies.
- In fourth year, there is detailed study of Biotechnology. Students also have the opportunity to study the business aspects of Biotechnology and the safety and legal requirements. Fourth year also involves a literature project and a three month work placement with a Biotechnology company.

Subjects in Full

Year 1

- Biology:
 - Introductory Cell Biology and Genetics
 - Fundamental of Science
 - Microbiology
 - Ecology
- Introductory Biotechnology
- Chemistry
- Mathematics
- Choose one:
 - Computer Science
 - Experimental Physics
 - Mathematical Physics

Year 2

- Biochemistry:
 - Plant Biochemistry
 - Process Biotechnology
 - Introduction to Cell Structure
 - Microdual Biochemistry and Physiology
 - Immuno and Molecular Biotechnology
 - Photosynthesis
 - Plant Breeding
 - Microdual
 - Molecular Genetics
- Chemistry.
 - Also choose one of:
 - Computer Science
 - Experimental Physics
 - Mathematical Physics

Year 3

- Biotechnology:
 - Animal Physiology
 - Mycology
 - Immunology
 - Plant Growth and Development
 - Enzyme Kinetics
 - Genetics
 - Biotechnology
 - Medical Microbiology
 - Animal Behaviour
 - Bioinformatics
 - Molecular Genetics
 - Venology
 - Protein Biotechnology
 - Population Genetics
- Chemistry

Year 4

- Biotechnology:
 - Plant Biotechnology
 - Molecular Genetics
 - Process Biotechnology
 - Biological Control
 - Fungal Biotechnology
 - Enzyme Biotechnology
 - Bioinformatics
 - Cell Division & Cell Death
 - Infection and Immunity
 - Molecular Immunology
 - Food Tecnology
 - Commercial and Business aspects of Biotechnology
 - Bioethics
- Work placement

Graduate Prospects

- There are prospects for graduates in sectors like Food, Biopharmaceutical; Diagnostics.
- Other opportunities include employment in Plant and Animal Breeding, Micro Propagation and Pest Control.
- Some students may wish to go on to complete postgraduate study.

<i>College: Dublin City University</i>	<i>Number of Graduates</i>
<i>Course: Biotechnology</i>	<i>2001: 58</i>
<i>Qualification: BSc</i>	<i>2000: 48</i>
<i>Duration: 4 yrs</i>	<i>1999: 48</i>

Course Description

- Course incorporates both a science component and an engineering component.
- Major emphasis on developing a wide range of analytical skills appropriate to the Biotechnology sector.
- First year is a general year and concentrates on general sciences in addition to computing and mathematics.
- Second year focuses equally on both biological and engineering aspects of Biotechnology, with third year introducing specialist areas of Biology including Immunology and Genetic Engineering.
- Fourth year take a close look at the fundamental biological and engineering principles of biotechnological process.
- Fourth year students chose three specialist areas of Biotechnology – see ‘Commercial Biotechnology Options’ (Year 4) below.
- There is a work placement in third year, with a research project in fourth year.

Subjects in Full

<p>Year 1</p> <ul style="list-style-type: none"> • Biology • Physics • Chemistry • Computing • Mathematics 	<ul style="list-style-type: none"> • Mathematics • Chemistry 	<ul style="list-style-type: none"> - Two-phase Fluid Flow Aeration and Agitation - Heat Transfer in Bioprocess - Filtration - Centrifugation - Evaporation - Drying 	<ul style="list-style-type: none"> - Industrial Enzymology - Protein Purification - Biosensors - Recombinant DNA Technology - Bioprocessing Laboratory
<p>Year 2</p> <ul style="list-style-type: none"> • Biology: <ul style="list-style-type: none"> - Biochemistry - Microbiology - Genetics - Instrumentation - Bio analysis • Process Engineering: <ul style="list-style-type: none"> - Engineering - Heat Transfer - Fluid Flow - Mass Transfer - Engineering Thermodynamics - Engineering Statistics 	<p>Year 3</p> <ul style="list-style-type: none"> • Biology: <ul style="list-style-type: none"> - Recombinant DNA Technology - Immunology - Food Science - Cell Structure - Plant Biotechnology - Molecular Genetics - Environmental Microbiology - Biochemistry Separations/Analysis • Bioprocess Engineering <ul style="list-style-type: none"> - Rheology of Biofluids 	<ul style="list-style-type: none"> • Commercial Biotechnology • Work Placement <p>Year 4</p> <ul style="list-style-type: none"> • Biotechnology Care <ul style="list-style-type: none"> - Batch and Continuous Bioreactors - Instrumentation and Control - Waste Treatment Engineering - Malting and Brewing - Microbial Biotechnology 	<ul style="list-style-type: none"> • Commercial Biotechnology Options: <ul style="list-style-type: none"> - Immunoanalysis - Genetics - Animal Cell Biotechnology - Biochemical Engineering - Environmental Biotechnology - Marketing - Food Biotechnology - Mathematics • Research project

Graduate Prospects

- Graduates from this course generally work in the following areas:
 - R & D
 - Production
 - Quality Control
 - Process Control
 - Sales and Marketing.
- Many graduates go on to postgraduate studies.

*College: DIT,
Cathal Brugha Street*

Course: Food Technology

Qualification: BSc

Duration: 4yrs

Number of Graduates

2001:

2000:

1999:

Course Description

- This degree in science allows the student to choose between Pharmaceutical, Technology or Food Technology.
- First and second year are common with diversions occurring in year three.
- Fourth year focuses in depth in chosen options.
- Students carry out an industrial placement in third year and research project in fourth year.

Subjects in Full

Year 1

- Foundation Chemistry
- Foundation Organic Chemistry
- Biology
- Physics
- Mathematics
- Computer Applications
- Industry Studies
- Communications
- Language (optional)

Year 2

- Organic Chemistry
- Physical Chemistry
- Biochemistry
- Instrumental Chemical Analysis
- Microbiology
- Introduction to Process Technology
- Nutrition
- Statistics
- Language (optional)

Year 3

- Food Chemistry
- Biotechnology
- Food Analysis
- Food Microbiology
- Food Processing
- Food Process Technology
- Quality Control/Quality Assurance
- Food Entomology and Parasitology
- Food Protection
- Environmental Management
- Technical Communication and Information Access
- Language (optional)

Year 4

- Food Science
- Food Technology
- Food Business Management
- Electives
- Industrial placement
- Project

Graduate Prospects

- This course provides the graduate with the opportunity to enter areas such as:
 - Production
 - Processing
 - Quality Assurance
 - Food Analysis
 - Product Development.

<i>College: DIT, Kevin Street</i>	<i>Number of Graduates</i>
<i>Course: Applied Science</i>	<i>2001:</i>
<i>Qualification: BSc</i>	<i>2000:</i>
<i>Duration: 4½ yrs</i>	<i>1999:</i>

Course Description

- This course is a general science course, allowing the student to specialise in third year in Food Science and Technology.
- First and second year provide options of Physics and Chemistry, with the Chemistry option being prerequisite for Food Science and Food Technology.
- This is a 4½ year course with the Food Science option.
- Part of year three may be spent abroad as part of the Socrates scheme.

<i>Subjects in Full</i>			
Year 1		Year 2	Year 3
<ul style="list-style-type: none"> • Physics <ul style="list-style-type: none"> - Mechanics - Physical Properties of Matter and Thermal Physics - Options and Sounds - Electricity and Magnetism - Atomic and Nuclear Physics • Chemistry <ul style="list-style-type: none"> - Analytical Chemistry - Organic Chemistry 	<ul style="list-style-type: none"> - Industrial Chemistry - Physical and Organic Chemistry • Mathematics <ul style="list-style-type: none"> - Calculus - Algebra - Computing and Practical Mathematics • Management Studies <ul style="list-style-type: none"> - Business Framework - Financial Control - Language (French, German, Spanish) 	<ul style="list-style-type: none"> • Physics <ul style="list-style-type: none"> - Electromagnetism - Circuits and devices - Options - Mechanics - Thermodynamics and Properties of Matter - Nuclear and Quantum Physics • Chemistry <ul style="list-style-type: none"> - Organic/ Inorganic/ Physical/ Industrial/ Analytical • Mathematics <ul style="list-style-type: none"> - Management Studies • Language (French, German, Spanish) 	<p>Students who have taken Chemistry option may now take Food Science and Technology</p> <ul style="list-style-type: none"> • Food Science and Technology <ul style="list-style-type: none"> - Biochemistry - Biology - Microbiology <p>Year 4</p> <ul style="list-style-type: none"> • Food Science and Technology • Food Chemistry • Food Processing and Distribution • Food Microbiology • Nutrition

Graduate Prospects

- Course is designed to provide graduates with career prospects in both industrial and commercial science sectors.
- Many graduates choose to pursue a Master's or Doctorate degree.
- Employment abroad is also a possibility if availing of the language options.
- The studying of management also enhances the graduates prospects of employment generally.

College: DIT, Kevin Street

Course: Applied Science

Qualification: Diploma Sc

Duration: 3 yrs

Number of Graduates

2001: 25

2000: 43

1999: N/A

Course Description

- This course provides technical training in the sciences.
- First year is a general year, after which students choose between Applied Biology, Applied Chemistry and Applied Physics.
- The Applied Biology option allows for the study of Food Science.
- Those with appropriate grades may move on to the degree course in Applied Science.

Subjects in Full

Year 1

- Physics
- Chemistry
- Biology
- Mathematics and Information Technology
- Business Studies
- French, German, Irish, Spanish

Year 2

- Applied Biology Option
- Biochemistry
 - Microbiology
 - Biotechnology
 - Cell Biology
 - Mathematics including Computer Studies
 - Quality Control
 - Good Laboratory Practice
 - Photography
 - Business Studies
 - Language

Year 3

- Business and a language (optional)
- Biochemistry
- Microbiology
- Biotechnology and Cell Biology
- Food Science (including Instrumentation and Central Systems)

Graduate Prospects

- Graduates have the option of joining the degree course.
- Graduates are qualified to pursue careers in industrial laboratories in the Food Processing industry.

<i>College: Waterford IT</i>	<i>Number of Graduates</i>
<i>Course: Agricultural Science</i>	<i>2001: 25</i>
<i>Qualification: Cert</i>	<i>2000: 21</i>
<i>Duration: 2 yrs</i>	<i>1999: 23</i>

Course Description

- This course is administered jointly by Waterford Institute of Technology and Kildalton College. (Kildalton focuses on the specialist areas concerned with plant production and management and provides facilities for plant production and experiment.)
- Laboratory-based scientific and other subjects are taken in WIT and the agriculturally focused subjects in Kildalton.
- This course is currently under developmental review.
- Students have option to proceed to diploma level.

<i>Subjects in Full</i>	
Year 1	Year 2
<ul style="list-style-type: none"> • Biology • Chemistry • Computer Applications • Mathematics • Physics 	<ul style="list-style-type: none"> • Animal Production • Crop Production • Food Science • Statistics • Good Laboratory Practice • Photography • Business Studies • Language

Graduate Prospects

- Opportunities exist in areas such as Technicians, Supervisors Commercial Representatives and Field Officers in agriculturally related industries, colleges and semi state bodies.
- Many graduates proceed on to diploma and degree level in this field.

College: Waterford IT

Course: Horticulture

Qualification: Diploma

Duration: 3 years

Number of Graduates

2001: Unavailable

2000: N/A

1999: Unavailable

Course Description

- This is a new course offered for the first time in 2001.
- The course runs in conjunction with Kildalton College.
- This course was set up in order to meet the need for horticulturists in Ireland.
- Students carry out 2 work placements and a project.

Subjects in Full

Year 1

- Introduction to Horticulture
- Science and Mathematics for Horticulture
- Computer Application and Communications
- Horticultural Business Management
- Horticultural Mechanisation

Year 2

- Building Construction
- Marketing and Quality Assurance
- Plant Identification and Use
- Work Placement 1
- Choose 1 from each group
 - Nursery Stock Production
 - Landscape Design

- Food Crop Production
- Green-keeping
- Group 2
 - Floristry
 - Food crops under protection
 - Ornamental crop production
 - Landscape construction
 - Mushroom production

Year 3

- Customer Services
- Human Resource Management
- Work placement 2
- Project
- Horticultural Business Management 2
- Garden Centre Operations
- Choose
 - Sportsturf
 - Speciality Foods Crops
 - Exterior Landscaping

Graduate Prospects

- The National Development Plan 2000-2006 highlighted that there appears to be a shortage of horticulturalists, therefore graduates' prospects are good.
- This course will prepare people for careers in the management and supervisory staff sector of the horticulture industry.
- Career options may vary from garden centre management to food crop and mushroom production.

College: Sligo IT

Course: Food Science

Qualification: Cert

Duration: 2 yrs

Number of Graduates

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- The course is aimed at students who would like to work in the areas of agribusiness and Food Processing. An increasing number of students opt for further education by pursuing diplomas or degrees in Food Science. This option is offered subject to a sufficient number of students opting for the course to make it viable.

Subjects in Full

Year 1

The curriculum in year one is common to the National Certificate in Science (Applied Biology and Applied Chemistry). Subjects covered include:

- Biology
- Chemistry
- Physics
- Mathematics
- Laboratory Practice
- Information Technology

Year 2

Subjects covered in year two include:

- Food Science
- Food Microbiology
- Instrumentation
- Food Production
- Statistics/ Computing

Graduate Prospects

- Graduates of this course can expect to gain employment in a technical capacity in the public sector or in private industry in the areas of agribusiness and Food Processing.

College: Letterkenny IT

Course: Food Science

Qualification: Diploma

Duration: 3 yrs

Number of Graduates

2001: 5

2000: 15

1999: 13

Course Description

- The aims of this course are to prepare diploma level graduates for careers in agriculture and food related industries.
- The skills learnt on this course enable the graduate to have a detailed knowledge of the analytical procedures required by the industry in addition to being able to contribute to food product development.
- Students have the option of taking an extra year in order to move to degree level.
- Students complete a practical projects and a work placement.

Subjects in Full

Year 1

- Chemistry
- Biology
- Physics
- Mathematics and Information Technology
- Laboratory Practice and Procedure

Year 2

- Food Microbiology
- Food Chemistry and Nutrition
- Food Production
- Food Technology
- Instrumental Food Analysis
- Quality Assurance
- Experimentation Technology
- Project
- Work placement

Year 3

- Food Microbiology
- Food Chemistry and Nutrition
- Statistics and Quality Assurance
- Project
- Work placement

Year 4 Optional (degree level)

- Food Technology
- Microbiology Food Safety
- Human Nutrition
- Research Methodology
- Quality Management
- Food Fermentation
- Food Product Development
- Management Structure

Graduate Prospects

- Career opportunities include:
 - Productions supervisor/manager
 - Quality assurance technician/manager
 - College research technician
 - Product development technician/manager
 - Those with appropriate grades may pursue further study to degree level in Ireland or abroad.

<i>College: Galway/Mayo IT</i>	<i>Number of Graduates</i>
<i>Course: Aquaculture</i>	<i>2001: 9</i>
<i>Qualification: Cert</i>	<i>2000: 9</i>
<i>Duration: 2 yrs</i>	<i>1999: 8</i>

Course Description

- Course provides an understanding and technical knowledge of the scientific, engineering and concerned principles of agriculture operations.
- Students study Engineering and Business Skills, coupled with in-depth study of Farm Management and Aquaculture.
- Students have the opportunity to pursue further study with a one year diploma followed by a further year to degree level.

Subjects in Full

Year 1	Year 2
• Biology	• Aquaculture Practice
• Chemistry	• Aquatic Science
• Mathematics	• Aquaculture Engineering
• Physics	• Boat Handling, Maintenance and Safety
• Quality Control/Computer Applications	• Business Organisation and Marketing
• Language or Communications	• Husbandry of Aquatic Organisms
	• Introduction to Computing

Graduate Prospects

- Further study includes:
 - Diploma (Applied Aquatic Science at GM IT)
 - One year Post Diploma Degree
 - Applied Aquatic Ecology at GM IT
 - Marine Science, NUI Galway
 - Zoology, Aquaculture Degrees at Aberdeen University.
- Graduates have good employment opportunities in the shellfish and fish farming business.
- Graduates often enter at technician level, in time moving on to management positions.
- Opportunities also include research and development in aquaculture and fisheries management.

College: Dundalk IT

Course: Food Science

Qualification: Cert

Duration: 2 years

Number of Graduates

2001: 10

2000: 17

1999: 9

Course Description

- Course provides a wide variety of skills in Biochemistry, Microbiology and Instrumental Techniques.
- First year provides a good foundation in basic sciences and provides significant practical experience.
- The second year builds on this practical knowledge by adding a strong theoretical side to this.
- The food science certificate gives a blend of practical science skills and quality control/assurance.
- Students have the option to continue after certificate level to complete a diploma in Food Science & Technology.
- Degree level Food Science (Product Development) also available.

Subjects in Full

Year 1

- Biology 1 and 2
- Laboratory Safety
- Chemistry 1 and 2
- Mathematics 1 and 2
- Communications 1 and 2
- Computing 1 and 2
- Physics 1 and 2

Year 2

- Biochemistry 1
- Food Analysis
- Quality Management
- Microbiology 1
- Food Microbiology
- Instrumentation 1
- Water Quality and Waste Management
- Communications 3
- Food Technology
- Safety 2
- Statistics
- Data Handling and Analysis

Year 3 Optional (diploma level)

- Food Chemistry
- Statistics and Quality Control
- Food Microbiology
- Industrial Administration
- Food Technology

Year 4 Optional (degree level)

- Food Chemistry, Nutrition and Toxicology
- Management and Enterprise
- Food Biotechnology
- Work placement
- Quality Management
- Food Engineering
- Food Technology

Graduate Prospects

- Graduates face employment in a wide variety of laboratories and science based industries.
- This course provides the graduate with both the knowledge and skills to directly into the food industry and also an excellent base for further study.
- Further study may include National Diploma in Food Science and Technology and the Bachelor of Food Science Product Development.

<i>College: Blanchardstown IT</i>	<i>Number of Graduates</i>
<i>Course: Horticulture</i>	<i>2001: Unavailable</i>
<i>Qualification: Diploma</i>	<i>2000: N/A</i>
<i>Duration: 3 years</i>	<i>1999: Unavailable</i>

Course Description

- This course was introduced in 2001.
- Its aim is to provide the graduate with a foundation in technical skills in all areas of Horticulture.
- Students are taught the identification and use of crops and plants in the environment.
- Students also gain an understanding of Management and Information Technology.

Subjects in Full

Year 1	Year 2	• Elective 2 (choose 1)	• Work Placement 2
• Introduction to Horticulture	• Building Construction	- Floristry	• Project
• Science and Mathematics for Horticulture	• Marketing and Quality Assurance	- Food crops under protection	• Horticultural Business Management 2
• Computer Application	• Plant Identification and Use	- Ornamental crop production	• Choose 1
• Horticultural Business Management	• Work Placement 1	- Mushroom production	- Garden Centre Operations
• Horticulture Mechanisation	• Elective 1 (choose 1)	- Landscape construction	- Sportsturf
	- Nursery Stock Production		- Speciality Foods Crops
	- Landscape Design	Year 3	- Exterior Landscaping
	- Food Crop Production	• Customer Services	
	- Green-keeping	• Human Resource Management	

Graduate Prospects

- Graduates will be qualified to pursue careers in horticultural production at a management or technician level.
- Food crop and mushroom production are possible career paths.

*College: Queens
University Belfast*

Course: Food and Nutrition

Qualification: BSc

Duration: 4 yrs

*Number
of Graduates*

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- This course provides the graduate with in depth knowledge of Food Science, coupled with a solid understanding of human nutrition.

Subjects in Full

Year 1

- Introductory Chemistry 1 and 2
- Introductory Biology Level 2

Year 2

- Applied Biochemistry
- Information Technology
- Introduction to Food Chemistry
- Introduction to Anatomy and Physiology
- Introduction to Agricultural Systems
- Applied Microbiology
- Food Composition
- Fundamental Nutrition

Year 3

- Food Biophysics
- Research Methods
- Introduction to Statistics
- Food Microbiology
- Food Quality
- Advanced Analytical Techniques in Nutritional Chemistry
- Food Preservation
- Diet and Health

Year 4

- Human Resource Management
- Research project
- Health Promotion and Empowerment
- Specialist Topics:
 - Food and Nutrition
 - Food Quality and Safety
 - Chemical Nutrition

Graduate Prospects

- Strong demand for graduates in this area, in particular in the UK.
- Opportunities exist both locally and nationally.
- The degree allows for technical careers within food production and distribution.
- Many graduates go on to postgraduate study in Dietetics.

College: Queens University Belfast

Course: Food Science

Qualification: BSc

Duration: 3 yrs

Number of Graduates

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- This course provides the background in basic sciences, including Food Science.
- Students develop an understanding of basics of food quality from scientific, regulatory and consumer viewpoint.
- The course allows students to develop analytical, research and communication skills through application and assessment throughout the degree.
- Students undertake a minimum of 10 weeks or maximum of one-year work experience.
- Industry visits are an integral part of the curriculum.
- There is also opportunity to study abroad in affiliated universities.
- For those students who successfully complete a year work placement, the opportunity exists to attain the Senior Award (Licentiatehip) of the City and Guilds of London Institute.

Subjects in Full

<p>Year 1</p> <ul style="list-style-type: none"> ● Agricultural Systems ● Introductory Food Chemistry ● Introductory Maths and Statistics ● Communication and IT Skills ● Applied Biochemistry ● Food Composition 	<ul style="list-style-type: none"> ● Applied Microbiology ● Food Business Economics and Marketing <p>Year 2</p> <ul style="list-style-type: none"> ● Food Biophysics ● Food Colour and Oxidation ● Food Microbiology ● Food Engineering ● Food Preservation 	<ul style="list-style-type: none"> ● Food Hygiene ● Savoury Science ● Human Nutrition ● Work Placement <p>Year 3</p> <ul style="list-style-type: none"> ● Science and Technology of Commodity Processing (meat, dairy, cereals, fruit and vegetables) 	<ul style="list-style-type: none"> - Food Quality and safety - Food Biotechnology - Food Marketing - Product Development - Food Plant Layout and Operation Project
--	---	---	---

Graduate Prospects

- Many opportunities exist in every sector of the food processing industry.
- Graduates have been employed with the following:
 - Coca Cola
 - Dromora Quality Foods
 - Dungannon Meats
 - Nestle.
- Graduates are also prepared for positions in marketing, management, sales and finance.
- Many go on to further study.

*College: Queens
University Belfast*

Course: Agriculture

Qualification: BAgr

Duration: 3 yrs

*Number
of Graduates*

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- Course is designed to provide a broad based knowledge and fundamental understanding of the many disciplines which constitute to general agriculture.
- A minimum of 10 weeks experience is required prior to graduation.
- A study tour in the final year allows students to visit agricultural and agricultural related enterprises.
- A key skills course runs through the course, teaching students skills such as teamwork and time management.
- The facility has links with Penn State and Michigan State Universities in the US and student may take study or work opportunities abroad through the University.

Subjects in Full

Year 1

- Introduction to Biological Systems
- Introduction to Agricultural Systems
- Applied Microbiology
- Introduction to Agricultural Economics
- Soils and Plant Nutrition

Year 2

- Pet and Disease Biology
- Animal Science 2
- Animal Production 1
- Plant Breeding and Genetics

Year 3

- Grass and Forge Production and Mechanisation
- Farm Business Management and Production Economics
- Agricultural Marketing, Policy and Communications

- Animal Health and Production
- Advanced Animal Science
- Crop Protection
- Environmental Management
- Project

Graduate Prospects

- The broad range of the BAgr allows the graduate to find employment in areas within and outside Agriculture.
- Besides the agrifood industry, employment is often found in areas such as computing, economics, lecturing and management.

College: Queens University Belfast

Course: Agricultural Science

Qualification: BSc/BAgr

Duration: 3 years

Number of Graduates

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- Students study for three years a primary degree programme in Biochemistry, Biological Science or Chemistry, submitting a single module in Agriculture for an optional module in year 2.
- Students with appropriate grades can complete a fourth year in the School of Agriculture and Food Science.
- The aim of the course is to prepare graduates for careers in research, specialist advisory and educational careers.

Subjects in Full

<p>Year 1</p> <ul style="list-style-type: none"> • Biological Science <ul style="list-style-type: none"> - Biological Diversity - Genetics and Molecular Biology - Microorganisms - Biochemistry - Environmental Biology - Biosciences Or • Chemistry <ul style="list-style-type: none"> - Analytical Chemistry - Organic Chemistry - Inorganic Chemistry - Physical Chemistry Or • Biochemistry <ul style="list-style-type: none"> - Biochemistry - Genetics and Molecular Biology - Microorganisms - Skills in Biosciences - Chemistry 1 and 2 	<p>Year 2</p> <ul style="list-style-type: none"> • Biological Science <ul style="list-style-type: none"> - Genetic Manipulation - Electron Microscopy - Physical Studies of Living Organisms - Modern Approaches to Ecology and Evolution Or • Chemistry <ul style="list-style-type: none"> - Analytical Chemistry - Organic Chemistry - Inorganic Chemistry - Physical Chemistry - Theoretical Chemistry - Spectroscopy Or 	<ul style="list-style-type: none"> • Biochemistry <ul style="list-style-type: none"> - Mammalian Biochemistry - Microbial Metabolism and Physiology - Molecular Enzymology - Molecular Genetics - Physical and Analytical Biochemistry - Cell Biology or Virology <p>Year 3</p> <ul style="list-style-type: none"> • Biological Science <ul style="list-style-type: none"> - Research Project - 4 Taught Modules in Bioscience Or • Chemistry <ul style="list-style-type: none"> - Environmental Chemistry - Inorganic Chemistry - Organic Chemistry - Physical Chemistry 	<ul style="list-style-type: none"> - Laboratory Based - Research Project Or • Biochemistry <ul style="list-style-type: none"> - Bimolecular Structure - Cell Signaling - Genetic Manipulation and Protein Engineering - Molecular Pathology and Immunology <p>Year 4</p> <ul style="list-style-type: none"> • Agricultural Science <ul style="list-style-type: none"> - Specialist Developments - Soils and Plant Nutrition - Animal Science • Research Project (Choose one) <ul style="list-style-type: none"> - Advanced Crop Science - Environmental Management - Advanced Animal Science
--	--	---	--

Graduate Prospects

Graduates find employment in a wide range of jobs including:

- Research Scientist
- Specialist adviser for food company
- Managing a food mill
- Financial services
- Nutritional advisor
- Equine feeds representative
- Teaching
- Business managers

*College: Queens
University Belfast*

Course: Agricultural Technology

Qualification: BSc

Duration: 4 years

*Number
of Graduates*

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- This course presents the student with a range of skills that can be successfully applied to various aspects of agriculture.
- The course provides technical and scientific knowledge coupled with a broad range of business subjects.
- First and second year are spent studying a wide range of theoretical modules.
- Third year is spent on a work placement, both in the industry and on the farm.
- Fourth year is spent at Queens studying differing aspects of agribusiness plus electives.
- A research project is completed in fourth year.
- The faculty offers travel opportunities for students with direct exchange programme links with Michigan and Penn State Universities in America.
- Job placements are also available within Europe.

Subjects in Full

Year 1

- Applied Enterprise Technology
- Principles of Mechanisation
- Agricultural Economics and Policy
- Animal Science

Year 2

- Animal Husbandry
- Arable Crop Production and Technology
- Human Resource Management
- Information Technology
- Research Methods and Statistics
- Farm Management and Accounts

Year 3

- Placement year spent both on the farm and in the industry

Year 4

- Agricultural Marketing
- Agribusiness Management
- Communication and Chance

• Electives:

- Applied Technology
- Animal Technology
- Specialist Crops
- Animal Welfare and Animal Health
- Animal Nutrition
- Environment
- Advanced Information Technology

Graduate Prospects

Graduate prospects in the agricultural industry include:

- Marketing and sales
- Production
- Technical Advice
- R and D
- Management.

College: Loughry College

Course: Food Technology

Qualification: BSc

Duration: 4 years

Number of Graduates

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- The course is designed to prepare graduates for entrance into the food industry as food technologists.
- The course follows a multidisciplinary approach.
- Both in first and second year, scientific and business modules are studied with a work placement year in third year.
- Fourth year allows the student to study the food industry itself and complete a practical project.

Subjects in Full

Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> ● The Food Industry and Preferred Studies ● Quantitative Methods and Information Technology ● Food Processing Systems ● Food Biochemistry and Structure ● Food Business Management ● Food Microbiology 	<ul style="list-style-type: none"> ● Food Composition ● Food Manufacture ● Business and Operations Management ● Sourcing and Purchasing ● R and D Methodology and Problem Solving ● Product Innovation 	<ul style="list-style-type: none"> ● Work Placement 	<ul style="list-style-type: none"> ● Food Industry Studies ● Advanced Food Manufacture ● Projects (choose two): <ul style="list-style-type: none"> - Food Manufacture - Food Quality Management - Food Product Innovation - Food Supply Technology

Graduate Prospects

- The course is geared towards training food technologists.
- Due to the courses multidisciplinary approach though, graduates have many opportunities in areas such as agriculture and business.

College: Loughry College

Course: Food Technology

Qualification: Higher National Diploma

Duration: 2 years

Number of Graduates

2001: Unavailable

2000: Unavailable

1999: Unavailable

Course Description

- The course is designed to prepare graduates for junior/trainee management parts in the Food Industry.
- The course takes a broad approach providing the graduate with multi-skills.
- First year covers a wide range of subjects in the area of Food Science and includes courses in Management and Marketing.
- Second year looks at these subject areas in more detail and students must compete a project.
- A work placement is carried out in of second year with the student having the option of taking a full year to undertake this.

Subjects in Full

Year 1

- Food Product Manufacture A
- Food Processing Systems
- Food Chemistry and Nutrition
- Food Analysis
- Food Hygiene, Legislation and Quality Assurance
- Food Microbiology
- Food Marketing
- Work placement

Year 2

- Food Product Chemistry
- Food Preservation and Packaging
- Food Product Microbiology
- Food Product Manufacture B
- Supervisory Management

- Food Technology Projects (choose two):
 - Food Product Manufacture
 - Food Frozen Engineering
 - Quality Management and Total Quality
 - Laboratory Management
 - Product Development A
 - Product Development B

Graduate Prospects

- Opportunities exist for graduates in management in the Food Industry.
- Students can also continue study on to degree level in Loughry College.

<i>College: Loughry College</i>	<i>Number of Graduates</i>
<i>Course: Food Science</i>	<i>2001: Unavailable</i>
<i>Qualification: Diploma</i>	<i>2000: Unavailable</i>
<i>Duration: 2 years</i>	<i>1999: Unavailable</i>

Course Description

- This course has been running in Loughry for over 30 years.
- Graduates are prepare to enter the food industry as Supervisors, Technicians and in quality control.
- First year involves the study of science as well as food preservation and technology.
- Second involves the study of management related subjects including supervisory skills and professional studies coupled with Food Process Engineering.
- Over the two years subjects include Technologies of Meat, Dairy, Beverage, Cereal, Fruit and Vegetable.

<i>Subjects in Full</i>		
Year 1	Year 2	• Choose one course option:
• Core Science	• Handling, Packaging and Distribution	1. Food Technology
• Computer Applications	• Nutritional Aspects	- Lab Techniques
• Food Industry Calculations	• Food Process Engineering	- Food Chemistry
• Food and Factory Hygiene	• Supervisory Skills	- Microbiology
• Quality Assurance	• Professional Studies	- Physics
• Food Preservation		2. Product Management
• Food Industry		- Food Science
• Food Technology		- Product Management
• Work Placement		- Product Development
		- Food Factory Design and Layout

Graduate Prospects

Graduates will be qualified to enter industry at many levels, including:

- Production Supervisor
- Quality Controllers
- Laboratory Technicians
- Product Development Technologists.

There is also the opportunity to progress to the Higher National Diploma or Degree level at Loughry College.

Appendix 6.1

Public Providers of Training

Contents

Food Hygiene	158
Food Safety/Quality Management	159
HACCP/ISO	159
Supplier and Internal Auditing	159
Legislation	160
Craft Operatives	160
Sales/Marketing/Key Account Management	160
NPD/Food Science/Technology	161
Production/Operations Management	162
Train-the-Trainer	162
Public Providers of Training	163

** BIM provide a range of courses in commercial fishing and aquaculture which are not documented here.*

Food Hygiene

Provider's Name	Course Title	Qualification Type				Awarding Body
		Course No.	Dip	Cert	Short Course/ Workshop	
1. CERT	Primary Course in Food Hygiene	1.			•	EHOA*
2. DIT, Food Product Development Centre, Cathal Brugha Street	Basic Food Hygiene	2.			•	
	Food Hygiene "Train-the-Trainer"	3.			•	
3. FÁS – Training and Employment Authority	Certificate in Foundation Hygiene (being modified)	4.		•		FETAC/FÁS/ City & Guilds
	Certificate in Food Hygiene and Technology	5.		•		FETAC/FÁS/ City & Guilds
4. Teagasc – National Food Centre	Certificate in Food Hygiene	6.		•		FETAC/FÁS/ Excellence Ireland/UCC
	Certificate in Foundation Hygiene for Food Handlers	7.		•		FETAC
	Introduction to Microbiology	8.			•	FETAC
	Vocational Certificate in Meat Hygiene	9.		•		FETAC
	Food Safety and Hygiene	10.			•	FETAC/IBEC FDF Skillnets/ ICTU**
	Trainer Skills in Food Safety and Hygiene	11.			•	FETAC
	Plant and Process Hygiene	12.			•	FETAC, FÁS

* Environmental Health Officers Association (EHOA).

** Irish Congress of Trade Union (ICTU).

Food Safety/Quality Management

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
1. DIT, Food Product Development Centre, Cathal Brugha Street	Introduction to Food Microbiology	1.			•
2. FÁS – Training and Employment Authority	Certificate in Food Safety and Quality Management	2.		•	FETAC
	Certificate in Food Safety Auditing	3.		•	FETAC
3. Teagasc – National Food Centre	HACCP in Food Safety	4.			• FÁS, FETAC
4. Teagasc – Research Centre Courses	Process Control and Management	5.			• FETAC
5. University College Dublin	Certificate in Food safety and Handling	6.		•	NUI

HACCP/ISO

1. CERT	Implementing Hazard Analysis Workshop	1.			•
2. DIT, Food Product Development Centre, Cathal Brugha Street	Introduction to HACCP	2.			•
	How to write a HACCP plan for Catering Operations	3.			•
3. Teagasc – National Food Centre	HACCP in Food Safety	4.			• FÁS, FETAC
4. UCC – Food Industry Training Unit	HACCP	5.			•

Supplier and Internal Auditing

1. Teagasc – National Food Centre	Laboratory Auditing	1.			•
-----------------------------------	---------------------	----	--	--	---

Legislation

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
1. DIT, Food Product Development Centre, Cathal Brugha Street	Food Legislation	1.			•	
	2. Teagasc – National Food Centre	Principles of Food Legislation	2.			•
		Laboratory Accreditation	3.			•
		Laboratory Auditing	4.			•
		Legal Labels	5.			•
		Food Law Update	6.			•

Craft Operatives

1. DIT Mountjoy Square	Meat Management	1.	•		Association of Craft Butchers of Ireland
	Meat Apprentice	2.	•		Dublin Master Victuallers' Association
2. Teagasc – Research Centre Courses	Processed and Substitute Cheese Products	3.			• FETAC
	Spray Dying	4.			• FETAC
	Evaporation	5.			• FETAC
	Basic Milk Processing	6.			• FETAC
	Natural Cheese Making	7.			• FETAC

Sales/Marketing/Key Account Management

1. DIT Food Product Development Unit	Introduction to Marketing	1.			•
--------------------------------------	---------------------------	----	--	--	---

NPD/Food Science/Technology

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
1. CERT	Applied Food Science Module	1.			•	National Tourism Certification Board (NTCB)
2. DIT, Food Product Development Centre, Cathal Brugha Street	Sensory Analysis	2.			•	
	Product Styling Techniques	3.			•	
3. Teagasc – National Food Centre	Product Tasting	4.			•	
	Innovation and R&D Management	5.			•	
	Creativity Workshop	6.			•	
4. UCC Food Industry Training Unit	Certificate in Innovation and R&D Management for the Food Industry	7.			•	FÁS, EI
	Customised Short Courses and Workshops	8.			•	FÁS, EI
	In-Company Training and Development	9.			•	FÁS, EI
	Certificate in Food Science and Technology	10.			•	FÁS, EI
	Certificate in Meat Technology	11.			•	FÁS, EI
	Diploma in Food Science and Technology	12.			•	FÁS, EI

Production/Operations Management

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
1. UCC Food Industry Training Unit	Diploma in Management Practice (Consumer Foods)	1.	•		FÁS, EI
	Diploma in Business Management for Middle Management	2.	•		FÁS, EI
	Diploma in Corporate Direction for Senior Management	3.	•		FÁS, EI

Train-the-Trainer

1. UCG	Train-the-Trainer	1.		•	Skillnets (Consumer Food Skillnet)
--------	-------------------	----	--	---	------------------------------------

Public Providers of Training

Enterprise Ireland contribution to HRD in the food sector

EI has over 2001 and 2002 approved over £5m. in support for HRD programmes in individual food companies.

The following are some specific sectoral initiatives that EI have introduced for the Food Processing Industry in recent years.

Graduate Development Programme for new entrants to the Food Industry. The purpose is to develop Business Skills for the new entrants who primarily come from a technical background. In the past year the initiative has been open to existing employees with the purpose of developing the management capabilities of the employees. EI have the capacity to fund 40 places on this initiative but in recent years only 15-20 places per year have been taken up by industry. The initiative is run by UCC for Enterprise Ireland and has been in place since 1996. The initiative is delivered over a twelve month period and involves a series of nine 2-3 day workshops and extensive on the job coaching and mentoring by experienced executives.

A Dairy Director Development Programme specifically designed for Farmer Directors of the Dairy Co-operative sector. The aim of the programme is to enhance the Strategy Development capabilities of the farmer directors of these enterprises. The first programme had in excess of twenty participants and commenced in 2001, finishing in 2002. A second programme is currently underway with 20 participants. The Programme is delivered by UCC in conjunction with ICOS. The programme involves a series of 8 two day workshops, completion of a project related to the participants Co-operative and visits to research unit/production facility overseas. The programme is certified by UCC.

A programme in Strategy and Change Management for second line companies in the Pork and Bacon sector. The objective of the programme was to encourage discussion and debate between participants related to the potential of the group to access overseas markets and to explore the possibilities of reducing costs as a result of co-operation on the home market. The programme was delivered over a twelve month period and had eleven participants. It was delivered and certified by Durham University and was completed in February 2003. Enterprise Ireland are continuing to work with the group on topics such as Benchmarking.

A Research and Development Programme specifically designed for the Food Industry. The Programme was delivered by UCC and consisted of 3 days of formal input on the topic of R&D, a four day visit to a European Food Fair and Research Institute and a period of one to one in-company mentoring/coaching on the topic of R&D. The objective of the programme was to facilitate companies to embed the R&D process and to assist them in working through new product proposals.

An International Marketing Initiative run in conjunction with IBEC for companies wishing to acquire Overseas Marketing Skills. The programme was designed and delivered by Saint Joseph's University, Philadelphia. The initial programme catered for 7 (seven) participants and discussions are ongoing with IBEC regarding a second programme.

Of the 42 EI funded participants on the *Export Oriented Programme* run by IBEC aimed at developing the Marketing and Management skills of participants and funded by EI and other state agencies, twenty eight were from Food and Drink companies.

In addition, individual food companies would have sent staff onto other EI funded skill development programmes in the marketing, technology, environmental and production areas.

Public Providers of Training

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
1. Enterprise Ireland	Graduate Development Programme for the Food Industry	1.	•		UCC
	Dairy Director Development Programme	2.		•	UCC
	Strategy and Change Management for second line companies in the Pork and Bacon sector	3.		•	Durham University
	Research and Development Programme	4.		•	UCC
2. Enterprise Ireland/IBEC	International Marketing Initiative	5.		•	St. Joseph's University, Philadelphia
3. Enterprise Ireland/IBEC	Export Oriented Programme	6.			IBEC

Appendix 6.2

Private Providers of Training

Contents

Food Hygiene	166
Food Safety/Quality Management	177
HACCP/ISO	179
Supplier and Internal Auditing	185
Legislation	185
Craft/Operative Trainers	185
Sales/Marketing/Key Account Management	186
NPD/Food Science/Technology	187
Production/Operations Management	188
Train-the-Trainer	189

** All Skillnet programmes are examples of programmes provided in the past year, however, many also run customised training programmes specifically tailored for individual company needs and so would not be included here.*

Food Hygiene

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
1. ADC Training	Essential Food Hygiene	1.			•	RBAI*
	Primary Certificate in Food Hygiene	2.			•	RIPHH**
2. Aine McCarthy and Associates	Basic Hygiene Course	3.			•	
	Management of Food hygiene in the Hospitality Industry	4.			•	NHP***
	Primary Hygiene Course	5.			•	EHOA****
3. Alcam Health and Safety Ltd. (Dublin Office)	Basic Food Hygiene for Food Handlers	6.			•	FÁS and CIEH*****
	Advanced Food Hygiene	7.			•	
4. Ashby Food Safety Association	Primary Food Hygiene Training	8.			•	EHOA, Certificate in Primary Food Hygiene
	Certificate in Primary Food Hygiene	9.			•	EHOA, Certificate in Primary Food Hygiene
5. Avonmore Waterford Consulting	Foundation Hygiene for Food Handlers	10.				EHOA, Certificate in Primary Food Hygiene
6. BSL Consultants	Foundation Hygiene for Food Handlers	11.			•	FÁS, City & Guilds
	Basic Food Hygiene	12.			•	Excellence Ireland
7. BIA Catering	Hygiene in the Catering Sector, Implementation of HACCP and Personal Hygiene	13.			•	

* RBAI Registered Board of Assessors Ireland.

** RIPHH Royal Institute of Public Health and Hygiene UK.

*** NHP National Hygiene Partnership.

**** EHOA Environmental Health Officers Association.

***** CIEH Chartered Institute of Environmental Health.

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
8. Brendan					
Goodrich Training and Consultancy	Primary Food Hygiene Certificate	14.		•	EHOA
	The Management of Food Hygiene	15.		•	
	Foundation Hygiene for Food Handlers	16.		•	FÁS
	Basic Food Hygiene	17.		•	
	Certificate in Food hygiene	18.		•	FÁS/City & Guilds
9. Cater Care Ltd.					
	Management of Food Hygiene in the Catering Industry	19.		•	
	Basic Principles of Food Hygiene	20.		•	EHOA
10. Central Health and Safety Service Ltd.					
	Primary Food Hygiene Course	21.		•	EHOA
	Food Safety/ Hygiene Auditing	22.		•	
	Food Hygiene Training	23.		•	
11. College of Cleaning Science					
	Cleaning Applications and Skills	24.		•	IICS*, BICS**
	Management of Food Hygiene in the Hospitality Industry	25.		•	NHP***
12. Christopher McKay	Food Hygiene	26.		•	
13. Circle Organisation					
	Hygiene and Health at Work	27.		•	
	Kitchen Care	28.		•	

* IICS Irish Institute of Cleaning Science.

** BICS British Institute of Cleaning Science.

*** NHP National Hygiene Partnership.

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type				Awarding Body
		Course No.	Dip	Cert	Short Course/ Workshop	
14. CK Food Safety Services	Certificate in Food Hygiene and Safety	29.		•		RIPHH
	Diploma in Food Hygiene and Safety	30.	•			RIPHH
	Food Hygiene Options	31.			•	CIEH
	Primary Course in Food Hygiene	32.			•	EHOA
	Basic Food Hygiene Update	33.			•	CIEH
15. Colette Duffy	Primary Course in Food Hygiene	34.			•	EHOA
16. Cregan Quality Consultants	Vegetable Hygiene	35.			•	Skillnets (Consumer Skillnet)
17. Criterion	Basic Food Hygiene Certificate	36.		•		CIEH
18. Consultant Services Ltd.	Primary Food Hygiene	37.			•	
19. CRM Consultants and Training	Management of Food Hygiene in the Hospitality Industry	38.			•	NHP
	Primary Course in Food Hygiene	39.			•	EHOA
	Foundation Hygiene for Food Handlers	40.			•	FÁS/City & Guilds
20. Crystal Food Safe	HACCP and Food Hygiene Training	41.			•	
21. Customised Food Industry Training Ltd.	Essential Food Hygiene	42.			•	RBAI
22. David Allen	Primary Course in Food Hygiene	43.			•	EHOA
23. David Mullarkey	Primary Course in Food Hygiene	44.			•	EHOA
24. David Power Consultancy Services	Primary Course in Food Hygiene	45.			•	EHOA
	The Management of Food Hygiene in the Hospitality Industry	46.			•	NHP

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
25. Dawn Meats (Exports Ltd.)	Hygiene Training Programme for Food Handlers	47.			•
26. Droichead Hygiene Systems & Solutions	Foundation Hygiene for Food Handlers	48.			•
27. Envirolab Ltd.	Food Hygiene for Food Handlers	49.			•
28. Environmental Health Officers Association	Primary Food Hygiene Course	50.			• EHOA
29. EPAS Consulting	Hygiene Training Course Food Production Unit	51.			• EPAS Laboratories
	Hygiene Training Induction	52.			•
	Primary Course in Food Hygiene	53.			• EHOA
30. Eugene Quinn	Principles of Food Hygiene and HACCP Practices	54.			•
31. Excellence Ireland	Basic Food Hygiene	55.			• Excellence Ireland
32. Focus Training and Advisory Services	Foundation Hygiene for Food Handlers	56.			•
	Certificate in Food Hygiene	57.		•	
	Principles of Hygiene and Safety for Retail	58.			•
33. Food BDS	Principles of Good Food Hygiene (Foundation Level)	59.			• EHOA, NHP, RIPHH
34. Food Flow Advisors	The Management of Food Hygiene	60.			• NHP
35. Food Focus	Basic Hygiene for Food Handlers	61.			•

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
36. Food Hygiene Management Co. Ltd.	Basic Food Hygiene	62.			•	EHOA
	Hygiene Talk	63.			•	
37. Food Hygiene Systems	Basic Food Hygiene Certificate	64.		•		CIEH, EHOA
	Primary Food Hygiene	65.			•	
38. Food Industry and Safety Training Ltd.	Food Hygiene Options Certificate	66.		•		CIEH
	Basic Meat Hygiene Options Certificate	67.		•		CIEH
	Foundation Certificate in Food Hygiene	68.		•		CIEH
	Intermediate Food Hygiene Certificate	69.		•		CIEH
	Advanced Food Hygiene Certificate	70.		•		CIEH
	Food Hygiene Update	71.			•	
39. Food Innovation Centre	Primary course in Food Hygiene	72.			•	EHOA
	Basic Hygiene Training Food Safety First	73.			•	
40. FoodLink	Food Safety and Hygiene Levels 1 & 2	74.			•	Skillnets (Leitrim Good Food Skillnet)
41. Food Management Systems Ltd.	The Management of Food Hygiene in the Hospitality Industry	75.			•	NHP
	Basic Food Hygiene (Certified)	76.		•		CIEH, Excellence Ireland, EHOA
	Foundation Hygiene Course	77.			•	
	Principles and Practices of Food Hygiene	78.			•	
	Intermediate Food Hygiene	79.			•	

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
42. Food Safety Services	Basic Food Hygiene Systems	80.			•	Excellence Ireland
	Foundation Hygiene for Food Handlers	81.			•	FÁS/City & Guilds
43. Foodtech Laboratories	Certificate in Hygiene	82.			•	City & Guilds
	HACCP & Hygiene First Certificate in Food Safety	83.			•	City & Guilds
	Foundation Hygiene Course	84.			•	City & Guilds
44. Galway/Mayo Institute of Technology	Certificate in Food Hygiene Management	85.			•	RSPH*
45. Good Ridge Training and Consultancy	Management Food Hygiene	86.			•	FÁS
	Primary Food Hygiene Cert	87.			•	FÁS
	Basic Food Hygiene Cert	88.			•	FÁS
46. Griffith Associates	Food Hygiene	89.			•	Skillnets (Consumer Food Skillnet)
	Primary Food Hygiene Course	90.			•	EHOA
47. Hospitality Solutions Consulting Ltd. T/A HSC	Senior Management/ Proprietor Introduction to Food Hygiene	91.			•	
	Introduction to Food Hygiene	92.			•	
	Management of Food Hygiene	93.			•	
	The Management of Food Hygiene in the Hospitality Industry	94.			•	NHP

* RSPH Royal Society for Promotion of Health (UK).

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
49. Industrial Management Systems	Intermediate Food Hygiene Certificate	95.		•	CIEH	
	Basic Food Hygiene System	96.			•	Excellence Ireland
	Basic Food Hygiene Certificate	97.		•	CIEH	
50. Innovative Food Solution	HACCP and Hygiene Training for Food Processors	98.			•	
	Food Hygiene Course for Food Service	99.			•	
51. Institute of Technology Tallaght	Management of Hygiene in the Hospitality Industry	100.			•	NHP
52. Invisio	Primary Course in Food Hygiene	101.			•	EHOA
	Food Hygiene – Bespoke Training & Consultancy Packages	102.			•	
	The Management of Food Hygiene in the Hospitality Industry	103.			•	NHP
53. Irish Food Safety Services	Management of Food Hygiene in the Hospitality Industry	104.			•	NHP
	Basic Course in Food Hygiene	105.			•	EHOA
54. Irish Retail Management Institute	Management of Food Hygiene in the Hospitality Industry	106.			•	NHP
	Primary Food Hygiene	107.			•	EHOA
55. Joan Dobson, Blackrock Road, Co. Cork	Food Safety and Hygiene	108.			•	Skillnets (FDF Skillnet)
56. John Hargaden	Food Safety and Hygiene	109.			•	Skillnets (Leitrim Good Food Skillnet)

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
57. Lizdonnelley Training	Basic Food Hygiene for Handlers	110.			•	EHOA
	Primary Course in Food Hygiene	111.			•	EHOA
58. MBW Training Ltd.	Basic Food Hygiene	112.			•	CIEH
59. McLogan Arthur	Basic Food Hygiene Certificate and Food Hygiene Options	113.		•		CIEH
	Essential Food Hygiene	114.			•	RSPH
60. Midwest Food Safety Co. Ltd.	Primary Food Hygiene Course	115.			•	EHOA
	The Management of Food Hygiene in the Hospitality Industry	116.			•	NHP
61. MRA HACCP Ireland	Food Hygiene Options	117.			•	CIEH
	Primary Food Hygiene	118.			•	EHOA
62. One World Learning	First Month Stage 1 Food Hygiene Course via CD Rom	119.			•	
	First Month Stage 11 Food Hygiene Course via CD Rom	120.			•	
63. Paul Boksberger Advisory Agency Services	Basic Food Hygiene	121.			•	
	Management of Food Hygiene	122.			•	NHP
	Primary Course in Food Hygiene	123.			•	EHOA
	Food Hygiene Induction Skills Stage 1 & 2	124.			•	
64. Practical Quality Assurance (PQA)	Essential Food Hygiene for the Food Industry	125.			•	

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
65. Promech Consultants, Enniscrone, Co. Sligo	Food Hygiene	126.			• Skillnets (FDF Skillnet)
66. Purcell Partnership	Hygiene Training	127.			•
67. Quality and Hygiene Systems	Primary course in Food Hygiene				• EHOA
68. Quality Food Care	Basic Food Hygiene	128.			•
	Primary Certificate Course in Food Hygiene	129.		•	EHOA
	Management of Food Hygiene in the Hospitality Industry	130.			• NHP
	Basic Food Hygiene/ Safety Certificate	131.		•	CIEH
	Primary Food Hygiene Certificate	132.		•	EHOA
69. Quality Food Training Ireland	Primary Food Hygiene Course	133.			• EHOA
	Basic Food Hygiene	134.			•
70. Registered Board of Assessors Ireland	Essential Food Hygiene	135.			•
71. Riverslade	Primary Course in Food Hygiene	136.			•
72. Rose Hibbitts	Quality and Hygiene Solutions Ltd., Leixlip	137.			• Skillnets (FDF Skillnet)
73. Ryland Research	Primary Course in Food Hygiene	138.			• EHOA
74. Safe Food Applications Ltd.	Food Hygiene Training	139.			•
75. Safe Food Solutions	Primary Course in Food Hygiene	140.			• EHOA

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
76. Safe Food Training	Primary Course in Food Hygiene	141.		•	EHOA
	Primary Course in Food Hygiene	142.		•	EHOA
	Basic Food Hygiene Certificate	143.		•	CIEH
	Intermediate Food Hygiene Certificate	144.		•	CIEH
77. Safety Quality System	Basic Food Hygiene Certificate 2a & 2b	145.		•	RSPH
	Primary Food Handlers	146.		•	EHOA
78. Scully Consulting	Primary Food Hygiene Programme	147.		•	EHOA
	Management of Food Hygiene	148.		•	IPB*
79. Seaver Associates	Food Safety and Hygiene Programme Level 1	149.		•	FETAC
	Food Safety and Hygiene Programme Level 2	150.		•	
	Hygiene Inspection in the Food Industry	151.		•	
	Foundation Hygiene for Food Handlers	152.		•	FÁS/City & Guilds
	Food Safety and Hygiene Programme – Trainer Skills	153.		•	FETAC
80. Society of Food Hygiene	SOFHT Hygiene Training programme – one day workshop	154.		•	SFHT**
	SOFHT Food Hygiene Microbiology Course	155.		•	SFHT

* IPB Irish Partnership Board.

** SFHT The Society of Food Hygiene Technology UK.

Food Hygiene *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert Short Course/ Workshop	
81. South Fermanagh Hygiene Training	Advanced Food Hygiene Certificate Level 3-1	156.		•	CIEH
	Basic Food Hygiene Certificate	157.		•	CIEH
	Intermediate Food Hygiene Certificate	158.		•	CIEH
82. SQT (Shannon Quality Training)	Certified Immediate Food Hygiene	159.		•	RIPHH
	Certified Basic Food Hygiene	160.		•	CIEH
83. St Angela's Food Centre	Hygiene for Food Handlers	161.		•	FÁS/City & Guilds Certificate in Food Hygiene
	Hygiene for the Catering Retail Sector	162.		•	FÁS/City & Guilds Certificate in Food Hygiene
84. Techno Path Ltd.	Food Hygiene	163.		•	
85. Training and Consultancy Services	Food Hygiene	164.		•	Skillnets (Consumer Food Skillnet)
86. Verner Wheelock Associates Ltd. (Carol Griffith)	Diploma in Food Hygiene and Safety	165.	•		RIPHH
	Certificate in Food Hygiene and Safety	166.		•	RIPHH
	Primary Course in Food Hygiene	167.		•	EHOA
87. West Cork Food Quality Systems	Food Hygiene and Safety	168.		•	
88. Western Health Board	Primary Course in Food Hygiene	169.		•	

Food Safety/Quality Management

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
1. Brendan Goodrich Training and Consultancy	First Certificate in Food Safety (Basic)	1.			• RIPHH
2. Central Health and Safety Services Ltd.	Health and Safety Training Courses	2.			• Skillnets (South Kerry Food Producers Skillnet)
3. C Hanley Consulting and Training	Quality Management Systems	3.			•
4. CRM and Co.	Occupational Health and Safety	4.			•
5. Educater Resources Ltd.	Food Safety Training Resource Pack	5.			•
6. Food Industry and Safety Training	Basic Health and Safety	6.			•
	Supervising Health and Safety	7.			•
	Advanced Health and Safety	8.			•
	Principles of COSMM	9.			
7. Food Innovation Centre	Food Safety First	10.			• City & Guilds
8. Foodlink	Foundation Food Safety	11.			• FÁS/City & Guilds
9. Foodtech Laboratories	Food Safety Training	12.			•
10. Food Safety Services	Basic Food Safety	13.			•
11. Frank Holland	Quality Management Systems	14.			•
12. Griffith Associates	Food Safety				• Skillnets (Consumer Food Skillnets)
		15.			
13. Innovative Food Solutions	Assured Safe Catering	16.			•
14. Mr PA Kidger, Newton Energy, Suffolk, UK	Environment Engineering and Safety Management	17.			• Skillnets

Food Safety/Quality Management *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
15. Pat O'Connor and Associates	Total Quality Management System	18.			•
16. Pierre's Food Service Ltd.	Pierre's Food Safety Training	19.			•
17. Quality FoodCare Ltd.	Food Safety Health Check/Auditing	20.			•
18. Quality Food Training Ireland Ltd.	Cleaning and Building Interiors	21.			•
	Basic Health and Safety	22.			•
19. Registered Board of Assessors of Ireland Limited	Internal Quality Management Systems Food Industry Food Safety Training	23.			• IRCA*
	Auditor/Lead Auditor Quality Management Systems, Food Industry, Food Safety Training Course	24.			• IRCA*, IATCA**
20. Riverslade	Induction to Food Safety	25.			•
21. Safe Food Applications Ltd.	Individual Group Coaching at Induction Stage One	26.			•
	Individual Group Coaching at Induction Stage Two	27.			•
22. South Fermanagh Hygiene Training	Meat Safety Certificate Level 1-2	28.		•	CIEH
23. SQT (Shannon Quality Training)	Internal Food Safety Auditor	29.			•
24. Steve Griffin, Quentech Valley View, Powys, Wales	Quality Control of Beer	30.			• Skillnets
	Management of Beer Quality	31.			• Skillnets

* IRCA International Register of Certified Auditors.

** IATCA International Auditor and Training Certificate.

Food Safety/Quality Management *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
25. Verner Wheelock	First Certificate in Food Safety	32.		•	RIPHH
	Theory and Practice of Effective Food Safety Inspection	33.		•	
	Management Principles of Food Safety Inspection	34.		•	
26. West Cork – Food Quality Systems	A Focus on Food Safety and Quality for Specialist Food Processors	35.		•	
	Quality Assurance for the Catering Industry	36.		•	
	Quality Assurance/ Quality Control and Good Manufacturing Procedures	37.		•	
27. Wholesale Retail Training Council	Food Safety – First Principles	38.		•	CIEH
	Food Safety for Supervisors	39.		•	CIEH

HACCP/ISO

1. Alcam Health and Safety Ltd. (Dublin/ Leinster/Midlands)	ISO	1.		•	
	Training and Implementation of HACCP Plans	2.		•	
2. Alcam Health and Safety Ltd. (Munster)	ISO	3.		•	
	Training and Implementation of HACCP Plans	4.		•	

HACCP/ISO *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
3. Ashby Food Safety Associates	HACCP Awareness and Implementation	5.		•	AFSA Certificate of Attendance
4. Biocare	HACCP Practices and Principles	6.		•	RSPH, CIEH
	HACCP Principles and Procedures	7.		•	RSPH, CIEH
5. Brendan Goodrich	Principles of HACCP	8.		•	RIPHH
	HACCP Principles	9.		•	FÁS/City & Guilds
6. BSL Consultants	Introduction to HACCP	10.		•	Excellence Ireland
7. Cater Care Ltd.	HACCP Seminar	11.		•	FÁS (Grant Aided)
	Joint ISO 9000 & HACCP Seminar	12.		•	FÁS (Grant Aided)
8. CCFRA Technology Limited	HACCP Workshop	13.		•	RIPHH
	HACCP – The Basics	14.		•	RSPH
	Advanced HACCP	15.		•	RSPH
	Auditing HACCP Systems	16.		•	
9. CK Food Safety Services	HACCP Programme	17.		•	
10. Central Health and Safety Services Ltd.	Advanced HACCP Certificate	18.		•	RAS International Food Safety Consultancy
	HACCP Plan Development	19.		•	HACCP Ireland
	HACCP Implementation Workshop (IS 343)	20.		•	HACCP Ireland
	Certificate in HACCP Principles and their Applications in Food Safety	21.		•	RIPHH
11. C Hanley Consulting and Training	HACCP Implementation	22.		•	

HACCP/ISO *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
12. Cregan Quality Consultants	HACCP Implementation	23.			•
	HACCP in Practice	24.			• CIEH
13. Customised Food Industry Training Ltd.	Hazard Analysis and development of your HACCP Plan	25.			• RBAI
14. David Power Consultancy Services	Consultancy on HACCP Implementation	26.			•
15. Enterprise Ireland	Introduction to HACCP	27.			•
16. EPAS Consulting	HACCP Installation	28.			•
	Introduction to HACCP	29.			• Excellence Ireland
	Certificate in HACCP Principles	30.		•	FÁS
	HACCP Training and Development	31.			•
17. Focus Training and Advisory Services	HACCP Principles of Hygiene	32.			•
18. Food BDS	HACCP Principles	33.			• RIPHH
19. Food Hygiene Management Co. Ltd.	HACCP Introduction	34.			•
20. Food Hygiene Systems	Certificate in HACCP Principles	35.		•	CIEH
21. Food Industry and Safety Training Ltd.	HACCP Principles and Practices	36.			• CIEH
	HACCP in Practice	37.			• CIEH
22. Food Innovation Centre	Food Safety System Implementation (HACCP)	38.			•
	Implementing Hazard Analysis (HACCP) Workshops	39.			• CERT/NHP

HACCP/ISO *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
23. Foodlink	HACCP Principles	40.			FÁS/City and Guilds
24. Food Management Systems	Implementing Hazard Analysis	41.			
	Hazard Analysis – Principles and Practice	42.			
25. Food Safety Services	HACCP	43.			
26. Foodtech Laboratories	HACCP Principles	44.			
27. Frank Holland	HACCP	45.			
28. Griffith Associates	HACCP				Skillnets (Consumer Food Skillnet)
		46.			
29. Hospitality Solutions Consulting Ltd. T/A HSC	Implementing HACCP workshop	47.			
30. Industrial Management Solutions	Introduction to HACCP	48.			Excellence Ireland
	HACCP in Practice	49.			CIEH
	Installation of HACCP and Quality Management Systems	50.			
31. John Hargaden	HACCP Training				Skillnets (Leitrim Good Food Skillnet)
		51.			
32. Knockacross Ltd.	Food Process/Hazard Analysis	52.			
33. Michael Daly Llewellyn Lodge, Model Farm Road, Cork	HACCP Training	53.			Skillnets (South Kerry Food Producers Skillnet)
34. MRA HACCP Ireland	HACCP Implementation	54.			

HACCP/ISO *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
35. Pat O'Connor and Associates	Hazard Analysis Critical Control Point	55.			•
36. Practical Quality Assurance (PQA)	HACCP Based Food Safety Systems ISO 9000 QS	56.			•
37. Purcell Partnership	HACCP Implementation	57.			•
38. Quality FoodCare Ltd.	HACCP Workshop	58.			•
	Basic Introductory HACCP Certificate Course	59.		•	CIEH
39. Quality Food Training Ireland	Basic, Intermediate, Advanced Food Hygiene, HACCP in Practice; Hazard Analysis Principles and Practice, Meat Safety Certificate	60.		•	CIEH
	Primary Certificate in Food Hygiene HACCP Workshop	61.		•	RIPHH
40. Registered Board of Assessors	Pre-HACCP Good Manufacturing Practice	62.			• In Association with Guelph Food Technology Canada
	Key Pre-HACCP Training Course	63.			•
	Key HACCP Internal Auditor Course	64.			•
	Food Quality Assurance for Food Catering/Retail HACCP Food Safety and QA	65.			•

HACCP/ISO *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
41. Riverslade	HACCP Health and Safety	66.			•
	HACCP for Executives (Business Reasons for HACCP)	67.			•
	Hazard Analysis and Development of your HACCP Plan Course	68.			•
42. Safe Food Applications Ltd.	Advanced HACCP Programme	69.			•
43. Safe Food Solutions	HACCP for Food Manufacturing in Small and Medium Sized Companies	70.			•
44. Safe Food Training	Hazard Analysis	71.			•
45. Seaver Associates	Implementing ISO 9001: 2000 in a Food Company	72.			•
	HACCP Workshop	73.			•
46. South Fermanagh Hygiene Training	HACCP in Practice	74.			•
	Hazard Analysis – Principles and Practice Certificate	75.		•	
SQT (Shannon Quality Training)	HACCP Development, Implementation and Auditing	76.			•
St Angela's Food Centre	HACCP Training Programme	77.			•
Verner Wheelock Associates Ltd.	HACCP Awareness	78.			•
	HACCP – The Fundamentals	79.			•
	HACCP – Making it work	80.			•
West Cork – Food Quality Systems	HACCP Management	81.			•

Supplier and Internal Auditing

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
1. CCFRA	BS EN ISO9000 Auditor/ Lead Auditor Training	1.			• IATCA
2. Safe Food Applications Ltd.	Audits/Surveys	2.			•
3. Griffith Associates	Food Auditing	3.			• Skillnets (Consumer Food Skillnet)

Legislation

1. FoodLink	Legislation for a Food Business	1.			• Skillnets (Leitrim Good Food Skillnet)
2. Knockacross Ltd.	Latest Legislation General Catering Course 2	2.			•
	Legal Label Workshops	3.			•
3. St Angela's Food Centre	Food Labelling and Legislation Training Course	4.			•
4. Dr Joe Kerry	Food Packaging and Labelling	5.			• Skillnets (South Kerry Food Producers Skillnet)

Craft Operatives

1. Mr Ach Hepworth, Fine Ale Services, West Sussex, UK	Beer Conditioning and Stabilisation & Filtration	1.			• Skillnets (Craft Brewers)
	Packaging, Warehousing & Dispense	2.			• Skillnets (Craft Brewers)
2. Customised Food Industry Training	Food Ingredients	3.			•
	Food Processing	4.			•

Craft Operatives *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
3. Quality Food Training Ireland Ltd.	Meat and Poultry Processing	5.			•
4. Mr Steve Griffin, Powys, Wales	Yeast and Brewing Fermentations	6.			•
	Product and Brewing Formulations	7.			•
5. Mr Tim O'Rourke, Marlborough, Wilts	Into to Brewing and Beverage Technology	8.			•
	Brewhouse Operations	9.			•

Sales/Marketing/Key Account Management

1. Aigne Training Systems, Suite 3C Market Court, Bray	Shop/Retail Staff Training	1.			•	Skillnets (ICOS)
2. BMS Training Galway (general trainers with food experience)	Communications	2.			•	Skillnets (New Product Introduction)
	Managing Change Through Team-working	3.			•	Skillnets (New Product Introduction)
3. Canty Associates, International Marketing Services, Larchfird House, Dundrum	Marketing	4.			•	Skillnets (South Kerry Food Producers Skillnet)
4. Mr David Malone, LMA Communications, Ranelagh, Dublin 6	Marketing Aspects of General Business Training	5.			•	Skillnets (Craft Brewers)
5. Focus Training and Advisory Services	Sales	6.			•	
6. Initiative Business Consultants Armagh	Coping with People	7.			•	Skillnets (Leitrim Good Food Skillnet)

Sales/Marketing/Key Account Management *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body	
		Course No.	Dip	Cert		Short Course/ Workshop
7. Dr Pat Griffin Business Development Consultant, Co. Kildare	Business Development	8.			•	Skillnets (South Kerry Food Producers Skillnet)
8. Quality Food Training Ireland Ltd.	NVQ Level 2 – Selling and Distributing Meat and Related Products	9.			•	Meat Training Council (MTC)
9. Registered Board of Assessors Ltd.	Develop Effective Marketing Strategies	10.			•	Skillnets (Craft Butchers)
	Business Management and Development	11.			•	Skillnets (Craft Butchers)
	Retail Development	12.			•	Skillnets (Craft Butchers)
10. Retail Training Consultancy Limited	5 Commodity Knowledge programmes: Getting the best from Fruit and Vegetables, Delicatessen, Seafood, Fresh Meat, Ready to Eat Foods	13.			•	FÁS
11. Sweeney Project Management	Plant Layouts	14.			•	Skillnets (Leitrim Good Food Skillnet)

NPD/Food Science/Technology

1. BBA Training Mallow	Idea Generation	1.			•	Skillnets (New Product Introduction)
	Project Management	2.			•	Skillnets (New Product Introduction)
	Business Plan Development	3.			•	Skillnets (New Product Introduction)
	New Product Introduction Process	4.			•	Skillnets (New Product Introduction)

NPD/Food Science/Technology *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
2. Customised Food Industry Training	Dairy Technology	5.			•
	Brewing Technology	6.			•
	Dairy Technology	7.			•
3. Foodlink	Innovation 2000 & New Product Development	8.			• Enterprise Ireland
4. Initiative Business Consultants Armagh	New Product Development and Innovation	9.			• Skillnets (Leitrim Good Food Skillnet)
5. St Angela's Food Centre	Sensory Analysis Training Course	10.			•
	Product Development Training Course	11.			•
6. Verner Wheelock	Certificate in Nutrition and Health	12.		•	RIPHH

Production/Operations Management

1. Galway/Mayo Institute of Technology	Meat and Poultry Butchery Operations NVQ Level 2	1.			• Meat Training Council UK
2. ICOS	Customised Development Programmes for Managers/Directors in Food and other Co-operatives	2.			•
3. Musgrave Super-Valu	Managing your Fruit and Veg Department	3.			•
4. Pat O'Connor and Associates	World Class Manufacturing	4.			•
	Induction Course for Employees Entering the Food Industry	5.			• FETAC
	Food and Drink Manufacturing Operations	6.			•

Production/Operations Management *continued*

Provider's Name	Course Title	Qualification Type			Awarding Body
		Course No.	Dip	Cert	
	Meat and Poultry Plant Operations	7.			•
	Meat and Poultry Butchery Operations	8.			•
5. Western Management Centre, Galway Business Park	Management Training	9.			•
6. World Class Success, Larchfield House, Dundrum	Customised Training	10.			•

Train-the-Trainer

1. Foodlink	Food Workers Trainership	1.			•
2. Promech	Train-the-Trainer	2.			•
3. Quality Food Training Ireland Ltd.	"Train-the-Trainer" NEBS Management	3.			•
4. Verner Wheelock	Trainer Skills	4.			•

Appendix 7.1

Education and Training Services in Denmark – Key Lessons for Ireland

Denmark

Introduction

This appendix profiles the education and training systems in Denmark. The profile is presented under the following headings:

- (i) Size/Importance of the Food Processing Sector
- (ii) Key Development Agencies in the Food Processing Sector
- (iii) Background Structure to the Education and Training System
- (iv) The Upper Secondary Level
- (v) Higher Education
- (vi) Adult Education
- (vii) Stakeholders in the Education and Training System
- (viii) Financing the Education and Training System
- (ix) Leading Education and Training Establishments in Denmark
- (x) Summary.

(i) Size/Importance of the Food Processing Sector

Danish agriculture accounts for a small but significant component of the country's overall economy, accounting for 2 per cent of GDP (about 5 per cent including the food processing sector), 17 per cent of total export earnings and employs 7 per cent of the workforce. In 2001 food production totalled €16bn and accounted for just under a quarter of total industrial production.

Denmark is a major agri-food exporting country, with nearly half its production sold abroad. Major exports include pork, cheese, beef and milk. Major imports include fruit and vegetables; animal feed preparations; grape wines; and miscellaneous food materials. Agri-food exports in 2001 were €8.3bn compared with imports of €3.1bn.

(ii) Key Development Agencies in the Food Processing Sector

The following agencies were identified as the main organisations with a role in the development of the food industry in Denmark:

- The Danish Trade Council
- Danish Agricultural Council
- Ministry for Food, Agriculture and Fisheries
- Ministry of Education

- Danish Institute of Evaluation
- National Labour Market Authority
- Ministry of Science, Technology and Innovation
- Agro Business Park.

The Danish Trade Council

The Danish Trade Council is the main body mandated with responsibility for encouraging and developing the export of Danish products and services. The agency operates under the aegis of the Ministry of Foreign Affairs, in co-operation with the Ministry for Food, Agriculture and Fisheries. It has a staff in 16 countries and covers 42 markets. The Council provides information and advice to Danish companies on market conditions, marketing and import regulations. However, in Denmark the onus of responsibility for promoting food exports lies primarily with private industry and individual firms rather than government.

The Danish Agricultural Council

The Danish Agricultural Council is an independent, self-financing, industry representative group that lobbies government on behalf of the agriculture industry and carries out the function of marketing and promoting Danish food exports abroad. Its 15 member supreme Council includes representatives of the Danish Bacon and Meat Council, the Danish Dairy Board, the Danish Farmers Union and Organic Denmark. As part of its sales and marketing function, it provides a wide range of services. These range from reserving spaces at international trade fairs to producing a finished stall with an individual or a common design, graphics, signs, and decoration. In addition, the Council arranges receptions, gala dinners, and buffets around the world where Danish businesses and organisations require a service of this kind. Moreover, the Council takes part in the implementation of public relation campaigns for Danish agricultural products on selected markets. The Council operates an office in Japan, with the aim of increasing the sale of Danish foodstuffs in this market.

The Ministry for Food, Agriculture and Fisheries

The Ministry for Food, Agriculture and Fisheries is responsible for developing a coherent policy on foodstuffs and ensuring that Denmark plays a pioneering role in food safety. The Ministry also plays an active role promoting research and development activities in the sector and has recently published its second food policy report, setting out the Government's objectives and action plan in relation to food policy and safety. As part of its R&D brief the Ministry is responsible for the Danish Institute of Agricultural Sciences, a research agency mandated to undertake research and accumulate knowledge of importance to agriculture. Moreover, in support of its role in promoting R&D activities in the sector, the Ministry operates a research grant programme on a 50-50 co-financing basis, between educational institutions and industry.

The Ministry of Education

The Ministry of Education has the lead responsibility in relation to the provision and funding of the education and training system in Denmark. The Danish Government plays an important role in providing education and training programmes to students interested in pursuing either a vocational or professional career in the food industry. All educational and training programmes at the level of primary, lower secondary, upper secondary and tertiary (third) level are free of charge. Furthermore, students over 18 years of age in upper secondary or tertiary education are entitled to allowances under the State Educational Grant and Loan Scheme.

The Danish Institute of Evaluation

The Danish Institute of Evaluation was established in 1999 as an independent government body, responsible for undertaking systematic and mandatory evaluation of teaching and learning at all levels of the education system, from kindergarten to postgraduate programmes. The Institute took over the responsibilities of the former Danish Centre for Quality Assurance and Evaluation of Higher Education and expanded its remit to the entire education system. The evaluations cover all educational establishments, both public and private in receipt of state subsidies. A primary aim of the institute is to raise standards in the training and education system. A core element of the evaluation procedure is the self-assessment that all educational establishments must undertake as part of the process. Board membership consists of representatives of the main levels and sectors of education and is appointed by the Minister of Education.

The National Labour Market Authority

The National Labour Market Authority is a government body operating under the aegis of the Ministries of Education and Labour. It is responsible for co-ordinating the government's active intervention in supporting employment initiatives in the labour market. These initiatives include: funding continuing adult education and training; unemployment benefit and assistance schemes and operating an employment service aimed at matching the unemployed with job vacancies.

The Ministry of Science, Technology and Innovation

The Ministry of Science, Technology and Innovation was created in November 2001, replacing the former Ministry of Information Technology and Research. In addition to undertaking the responsibilities of the predecessor the new Ministry's remit expanded to include the universities (research and education) industrial research and Denmark's policy on technology and innovation.

The objective of the Ministry is to promote the interaction of trade and industry, centres of research and education and to strengthen and co-ordinate industry and research policy.

Agro Business Park

The Agro Business Park, established in 2000 is located in the Danish mainland county of Viborg and operates under the control of the Ministry for Science, Technology and Innovation. It forms part of a network of six science parks established by the government, aimed at becoming focal points for research and developing cluster economies. The establishment of the Agro Business Park has its origin in the desire to enhance the cooperation between public research and the private sector within the agricultural and food industry. The main task of the Agro Business Park is to initiate the commercialisation of good ideas as well as research results through the establishment of new innovative companies or by bringing together stakeholders in the cooperation concerning the idea in question.

EBST (National Agency for Enterprise and Housing)

The EBST is a government agency operating under the aegis of the Ministry of Economic and Business Affairs. The EBST is mainly concerned with giving advice in co-operation with dedicated business advisors from the local municipalities to start-up companies. A very limited amount of direct grant assistance is available – financial assistance from government to private start-ups is atypical in enterprise policy in Denmark. The EBST, and local business advisors from the municipalities interact with the Danish Trade Council to assist new companies to access new overseas markets.

(iii) Background Structure to the Danish Education System

Training and education are highly respected in Denmark, with a culture that recognises the important role they play in improving the welfare of the individual and the country's competitive position in the world economy. In terms of the percentage of gross domestic product spent on education, Denmark has for a long time been a world leader. According to the latest OECD *Education at a Glance 2002*ⁱ, Denmark is ranked as the leading EU country in terms of expenditure on education as a percentage of total public expenditure (overall Denmark ranked 5th in OECD countries, with Ireland in 9th place and Finland in 12th out of 30 countries).

Concentration on human abilities has been regarded as necessary for a small country such as Denmark, which is very limited in terms of physical natural resourcesⁱⁱ. In assessing Denmark's opportunities in international competition Madsen and Larsen (1998) in *“Training and development in the Danish context: challenging education?”*, believed that:

“Denmark's only possibility of expansion is to become Europe's Japan. Denmark has, as Japan, intelligence as the only raw material and has therefore no other opportunities than to mobilise this energy source.”ⁱⁱⁱ

Like many countries, central government in Denmark exercises considerable influence and control over Danish education, which is centralised and generously financed by the government. However, unlike many countries the Danish education model places a heavy emphasis on practical experience in addition to academic standards when considering the admission of students to tertiary (third level) academic programmes.

Although there are only nine years of compulsory schooling, few students drop out after nine years. Most students complete at least 12 years of education or training.

The Danish education framework is a complex, multifaceted system, which has (and is) undergone/going considerable reform. These reforms have amounted to a substantial overhaul of the system from *folkskole* (primary and lower secondary) right through to tertiary level, albeit within the existing education and training framework. The overall aim of these reforms have been to strengthen the alignment between the education and economic systems. The most notable policy changes underpinning these reforms are:

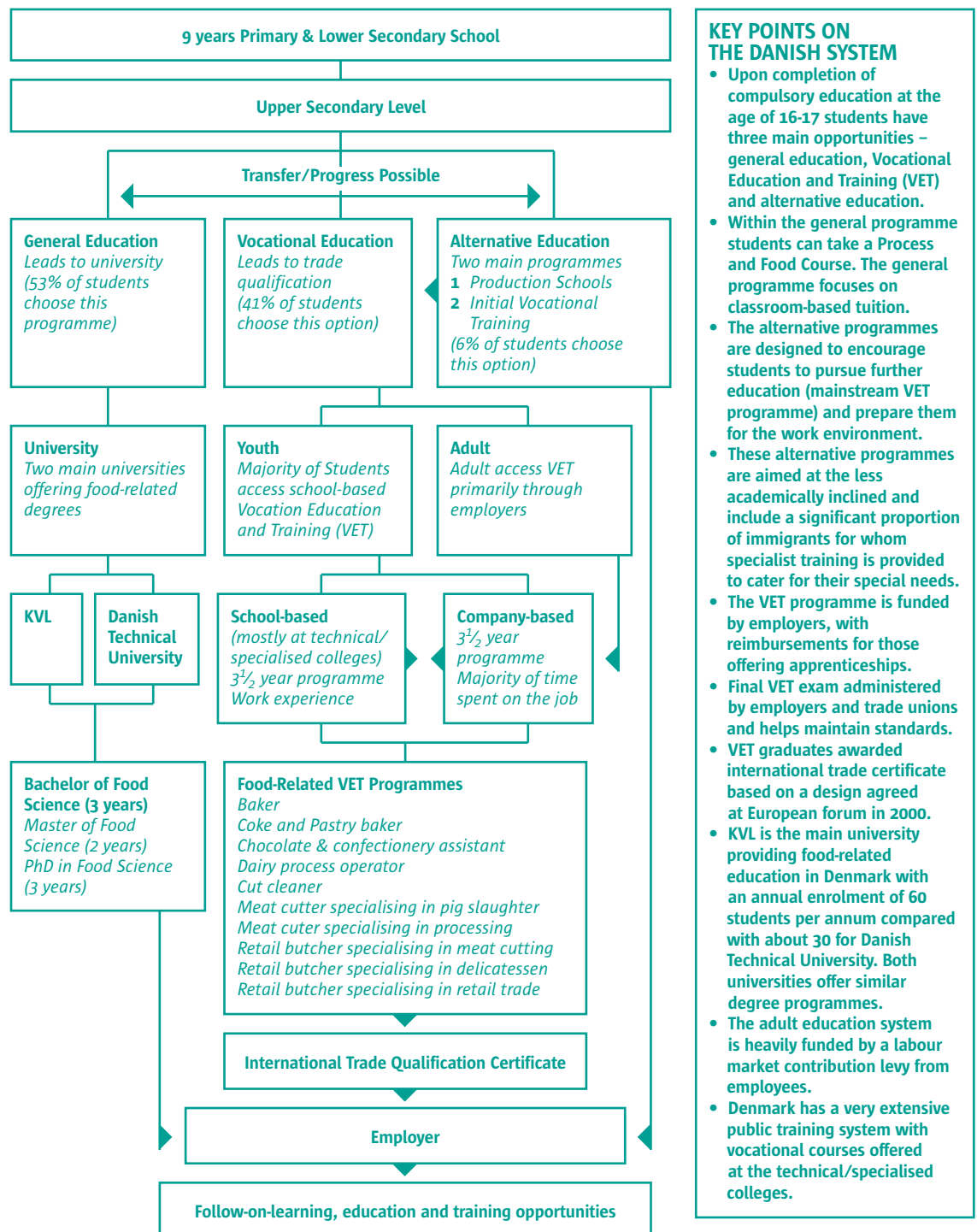
- The action plan for *“Better Education”*, aimed at reinforcing the competence level in the Danish education system
- *“The Danish Growth Strategy”*, designed to enhance growth conditions in Denmark
- Reform of the Danish research sector, aimed at concentrating the research on specific areas and on supporting the education of university graduates and PhDs
- Reform of the Danish system of research councils, aimed at allocating all public research grants for research on the basis of recognised research principles.

i OECD, “Education at a Glance 2002, October 2002”, OECD Paris.

ii Madsen, M. and Larsen H. (1998) “Training and development in the Danish context: challenging education?” Journal of European Industrial Training.

iii Mandag, M. (1994a): No.2 January 10, 1994.

Figure 1: Diagrammatic Overview of the education and training system in Denmark



Source: PricewaterhouseCoopers.

These reforms envisage that the future principal agents in the areas of education, research and industry will be the educators and the business community. Government's involvement will be primarily a supporting role acting as a 'strategic agent' in the capacity of promoting dialogue and goal-setting inside a flexible legal framework.

(iv) The Upper Secondary Level

Students enter upper-secondary programme at the age of 16-17, following completion of compulsory education, known as *Folkeskole*. The syllabus in the compulsory programme is uniform in nature.

At an upper secondary level in Denmark students have two main opportunities.

1. To pursue the general education programme that primarily leads to admission to university education (53% of students).
2. Vocational Education and Training (VET) programme that leads to a trade qualification (41% of students); the remainder of students pursue alternative type courses (e.g. production schools or vocational basic training courses designed to prepare them for a mainstream course or to enter the workforce).
3. Alternative programmes.

A brief overview of these three programmes is presented below.

1. *General Education Programme*

The general education programme prepare students for third level, predominantly university education by providing them with the necessary general and theoretical qualifications. There are four general education options in Denmark known as the Gymnasium, the HF, the HHX and the HTX. These programme options share many similarities in terms of the syllabi, with modest deviations in emphasis. In terms of the food industry education, only the HTX programme offers a specialisation “**Process and Food**”.

The HTX is a three-year programme offered by technical colleges. The programme is the youngest of the three other ‘generalist’ education programmes, having been established on a pilot basis in 1982. The course was introduced to broaden the supply and opportunities for students in the technical area and to strengthen the status of the technical schools. In 1998, the programme was made permanent and received the status of a university entrance examination, placing it on an equal footing with those of the Gymnasium, the HF and the HHX programmes, as far as access to higher education is concerned.

The HTX-programme is divided into years with a certain number of obligatory and optional subjects of both a general and vocational nature. In the last year of the programme, the students choose a technical subject, which determines the specialisation indicated on the course certificate. Five areas of specialisation are offered: Construction and Energy; Design and Production; Service and Communication; **Process and Food** and Nature and Agriculture.

The general objective of the program is to give students a general and technical upper secondary education, through a pedagogical approach involving both classroom and workshop related delivery mechanisms that qualify the student for admission to higher education. Despite the practical aspects of the course, no actual practical training is involved, although site visits to relevant businesses and institutions may be included in the instruction of some subjects. The programme furthermore provides a partial basis for occupational employment and a reduction of the period of schooling in a vocational education and training programme. The main destination of HTX graduates is university education programmes.

2. *Vocational Education and Training (VET)*

The Danish vocational education and training programmes offer a variety of technical and commercial courses. These courses are offered at 115 vocational colleges distributed at 48 business colleges and 38 technical colleges, 10 combined technical and business departments, 19 agricultural colleges and a small number of specialised institutions focusing on specific niches of the economy, e.g. the meat trade school located in Roskilde and Dalum Technical College (primarily dairy courses).

In 2001, the government instituted a number of reforms to simplify the structure of the technical programmes. An overall objective has been to create a flexible and transparent VET system based on the idea of lifelong learning.

A discernable movement can be detected in the principles behind the VET reforms:

- From teaching to learning
- From focus on qualifications to focus on competencies
- From classroom teaching to differentiated teaching, based on the needs of the individual
- From narrow to broad access routes
- From standardised to flexible modularised educational offers.

The access routes to a VET programme tend to be quite varied. While the majority of students enter the programme directly following completion of compulsory lower secondary education; a substantial proportion tend to migrate from the more academic education programme, *the Gymnasium*, or having completed other short-term vocational oriented programmes, namely the EGU. Additionally, participants accessing the VET programme tend to have a year or more work experience at an unqualified level before enrolling in a course.

Students may choose to access a VET programme by securing an apprenticeship contract directly with an employer as an alternative to choosing the school entry method. If an apprenticeship is secured the student begins the employment phase of the programme directly and alternates with school-based training.

A characteristic of the apprenticeship model is the high level of ongoing commitment required from both apprentices and employers. According to industry informants, three fundamental economic factors underpin this commitment and support the continuing significant role of the apprenticeship model in Denmark.

1. It provides a source of high quality workers with a strong reputation.
2. A competitive apprenticeship wage is paid, relative to the skilled wage.
3. Apprentices tend to become productive relatively quickly thereby ensuring the model remains economically viable.

The majority of students in Denmark tend to access the VET programme through the school route rather than the apprenticeship method, since the apprenticeship method requires students to secure a training contract with an employer in the first instance.

The vocational programmes consist of a basic course, which is the introductory part of the program, lasting 6 months, and a main course, which makes up the remainder of the programme's duration, generally lasting 3½ years. The course is structured as a "sandwich-type" programme, in which periods of theoretical education at school alternate with periods of practical training in a business enterprise.

The main course consists of both theoretical education at school and practical training in the chosen specialisation. The content of the programs is closely monitored by the Ministry of Education in co-operation with the colleges and social partners (trade committees and local education committees to ensure their continued relevance to skill needs in the workplace).

In order to complete the VET programme successfully, a student must pass all college-based assessments, obtain satisfactory employer reports and pass a final skills competency test (commonly referred to as the 'journeyman's test'). This final test is administered by the relevant employer and trade union committee representatives.

In July 2002, the Danish government began granting an award known as a 'Certificate Supplement' to candidates who have successfully completed a vocational education and training course. The design of the Certificates is administered by Cirius, an independent government institution connected to the Danish Ministry of Education. The role of Cirius is to promote international co-operation and mobility in education and training. These certificates are the Danish equivalent of a pan-European Certificate Supplement designed by the European Forum in 2000.

The supplements have been designed together with the educational authorities responsible for awarding the final exam certificate or certificate of apprenticeship for the education concerned. The content of the supplements is based on a description of the objective, duration and final qualification of the vocational education or training programme. The certificates are published in Danish, French, German and English in a standardised format and give a short list of the skills and qualifications achieved by an individual who has successfully completed the course. This facilitates pan-European recognition of the qualification and the inter-country mobility of labour.

The VET programme offers seven main areas of specialisation:

- Technology and communications
- Building and construction
- Crafts and engineering trades
- Farm to the fork – agriculture, food production, catering, etc.*
- Mechanical engineering, transport and logistics
- Service trades
- The commercial area – trade, office and finance.

** Within the farm to fork specialisation, a number of professional trade qualification can be pursued including:*

- Baker
- Cake and pastry baker
- Chocolate and confectionery assistant
- Dairy process operator
- Gut cleaner
- Meat cutter specialising in pig slaughter
- Meat cutter specialising in processing
- Retail butcher specialising in meat cutting
- Retail butcher specialising in delicatessen
- Retail butcher specialising in retail sale.

The aim of the program is to ensure the labour market has ready access to qualified skilled staff. In addition, to providing job opportunities, the program aims to inspire graduates to undertake further education.

Graduates who wish to pursue additional education have a number of options. They can undertake a further two years of technical training leading to a 'Diploma Supplement' or have the opportunity to pursue university studies, having completed a transition course.

3. Other Upper Secondary School Options

In addition to the two mainstream upper education programmes, a number of other alternative education structures exist, which act as a broad sweep for those students for which the main systems are less suited. There are three main alternatives on offer.

(a) Vocational Basic Training (known as the EGU)

The EGU is a two-year basic vocational training course designed to cater for a residual group of students who are unable to fulfil main VET programme criteria. The programme was introduced in 1993 and is aimed at less academically inclined young people. It is the responsibility of the municipalities to organise and provide an EGU programme. This tends to be done in close collaboration with local technical colleges. The course involves between 20-40 weeks school tuition as well as practical training. In many instances students on an EGU programme attend the same colleges that run the main VET programme or production schools (see production schools below). The main objectives of the programme are to help students become capable of undertaking a mainstream VET programme or gain employment in the labour force.

(b) Production Schools

There are 197 production schools in Denmark run mainly by local municipalities. The target group for these schools is specified as young people under 25 years of age, without vocational qualifications. The target group tends to be young people with learning difficulties, those who have dropped out of other education and training programmes and students with social or behavioural problems. A substantial portion of the student intake tends to be representatives of various immigrant groups that are lacking the skills and pre-conditions necessary to enrol on a VET programme.

The programme tends to act as a counter measure to youth unemployment in Denmark. The programme aims to strengthen the participants' personal, social and vocational development enhancing their opportunities for further education or work. The heuristic model adopted by production schools is to educate and train participants through hands-on practical experience in workshops, which form the basis for teaching of the theoretical aspects of the course.

In 1999 the Danish government enacted new legislation to strengthen the role played by the production schools in acting as a 'bridge builder between basic school and youth education'. The key emphasis of the production schools is to lay the foundation for students to participate in further vocational education and training. To this end, the schools play an important role in guiding students and are required in co-operation with the individual student to draw up a target oriented plan setting out the training and education outcomes to be achieved.

The production schools distinguish themselves from most other school forms in that they have a continuous intake of participants and vary greatly in terms of the duration of a participant's stay. A typical stay is approximately 6 months duration. According to the statute, participants stay at the school is limited to a maximum of one year.

(c) Individual Organised Youth Education (known as the FUU)

This program offers students an à la carte approach to choosing individual subjects (within broad limits) in the education and training system. The courses tended to be organised in the evening and weekends. The main focus was helping students who were having difficulty in completing compulsory education or those interested in learning a craft in their spare time. In November 2001, a decision was taken by the new Danish Government to suspend this programme, as the actual participants on the programme turned out to be 'strong' students. It was felt that the needs of 'weaker' students were adequately accommodated in the other available educational and training programmes.

(v) Higher Education Level

At the higher education level, the split between theoretical and practical-based courses evident in the upper secondary level is continued. The courses can be divided into three main categories according to the duration and nature of the programme (training or education).

- Short-Cycle Non-University Higher Education
- Medium-Cycle Non-University Higher Education
- Medium and Long Term University Education.

A brief description of the various opportunities that exist in these categories is presented below.

Short-Cycle Non-University Higher Education

This heading covers further technical, commercial and agricultural programmes.

Short-cycle higher education programs are typically of two years duration and in most cases the aim is to prepare the students for middle management functions in businesses. In August 2000, the Government introduced a widespread reform of the programme, aimed at simplifying its profile; raising the quality of the courses; and improving the coherence of the programme in the context of the overall training and education system. As part of the reforms around 75 of the existing programmes were discontinued and replaced by 15 new short-cycle higher education programs, including a programme in the food industry.

These short higher education courses tend to build on the competencies developed in the foundation courses taught at upper secondary level. In most cases the courses are offered in the same Institutions as their second level counterparts.

The entry requirements for the courses depend on the level of technical skills associated with the course. Generally speaking, completion of either the general education (*Gymnasium*) or VET programme at upper secondary level will be sufficient. However, certain courses with a strong technical skill base may require a supplementary course to be taken prior to entry.

The aim of the program is to qualify students with the requisite skills necessary to secure employment at a specialist or middle management level.

The programmes have a strong theoretical academic approach, with teaching mainly taking place at the educational institutions, with practical training forming only a limited part of the course.

In September 2002, The Danish Ministry of Education began granting Diploma Supplements to students who had successfully undertaken higher education programmes.

Medium Cycle Non-University Higher Education

These programme focus on specialised fields generally in the area of health and welfare including: midwifery, occupational therapy, physiotherapy, hospital laboratory work, teacher, etc.

Medium and Long Cycle University Education

The university system in Denmark reflects the Anglo-Saxon 3-2-3 model whereby primary degrees require three years academic study with a follow-on of two years academic study to attain a Master's degree and an additional three years for PhD level.

The main food-related courses at third level in Denmark are offered at Royal Danish Veterinary and Agricultural University (known as KVL) in Copenhagen in co-operation with the Danish Technical University.

Most students in Denmark tend to pursue the Master's programme upon completion of their primary degree. The MSc programme provides candidates with the opportunity to specialise in Dairy, Meat and Food Sciences and Technology. The Department of Human Nutrition at KVL also offers a graduate programme in human nutrition. Approximately 300 Food Science students are enrolled at KVL, and approximately 40 PhD students are employed at the Department of Dairy and Food Science. A broader description of the food-related courses on offer are discussed further on [see infra (ix)].

(vi) Adult Education and Training

Denmark has a long tradition in adult education and training. In the 1960s, the Danish government passed a series of Acts acknowledging the public sector's responsibility for the provision and financing of adult education and training.

Today, adult learning in Denmark can be divided into two main areas; labour market training, aimed at developing practical skills for participation in the work force and adult education, which tends to have a broader set of objectives ranging from improving numeracy and literacy skills, to advancing academic achievement level of the population. The following sections will describe both programmes individually, beginning with the labour market training.

Labour Market Training

Denmark has long operated an inclusive labour market training programme, known as the AMU, that recognises the importance of partnership between central and local government and the social partners (educators, businesses and trade unions). In 2001, the system underwent a series of reforms aimed at giving local administrators greater responsibilities and increasing the flexibility of the programme to react to changes in industry. Furthermore, primary responsibility for the programme was transferred from the Ministry of Labour to the Ministry of Education, to facilitate greater coherence between the programme and the existing education structures. The program is financed by a special labour market tax imposed on all those who are active in the labour market – employers as well as employees.

The labour market training program covers a wide range of continuing courses for semi-skilled and skilled workers. The programmes can be accessed by both the employed and unemployed, individuals that have completed a vocational education and training programme and persons with a further technical qualification.

The aim of the AMU is to reduce structural imbalances in the labour market by underpinning initiatives to promote employment, improve the chances of the unemployed in finding a job and stimulating job rotation in the labour market.

Table 1: Number of Participants on Danish adult education courses 2000

Employed	Unemployed	Unknown	Total
266, 730	25, 723	404	292,857

Source: AMS 2000.

Training opportunities are available within more than 50 sectors/occupations, offering more than 2,000 courses (95% of these courses provide a nationally recognised competence). These courses include programmes specialising in the dairy, meat and agriculture sectors. The courses, which are modularised, can be combined to gain a nationally recognised vocational qualification. Within this system there are three different categories of courses.

(a) *Individual courses*

These courses are usually composed of modules of 1-5 weeks duration. Each module gives the participant a formal qualification in relation to further training and employment. The modular structure of the programme makes it possible to establish 'systematic alternating training', whereby the course can be tailored to the individual needs of the participant or enterprise involved. In addition, the system also offers longer training programmes, which give participants the opportunity to achieve a recognised 'skilled' status in relation to an occupation.

(b) *Enterprise oriented courses*

These courses supplement the individual courses and can be adapted to meet the needs of a specific employer and its workforce. A charge may be associated with the tailoring of the programme to the needs of the employer.

(c) *Special courses for unemployed persons*

This programme is aimed at encouraging the unemployed back into the labour force. The programme consists of technical and vocational training that focuses on improving the participant's chances of achieving employment. In addition, a specific training programme for immigrants has been developed to help integrate this group into the labour market. The programme varies in length from 16-25 weeks and focuses on work introduction/language courses plus a 4-week practical training period in an enterprise.

Until recently, these courses could be accessed at one of 24 AMU training centres throughout Denmark. Many of these AMU centres already existed as vocational colleges in the main youth oriented vocational education and training programme. In November 2001, the newly elected Danish Government introduced a series of reforms to the adult VET programme and decided to formerly amalgamate dedicated AMU centres with existing technical colleges throughout the country. The aim of the reforms is to create a 'parallel adult education system'^{iv} whereby adults are given a second opportunity to undertake the same courses that are available in the initial (youth) VET programmes. Other important features of the reform are to:

- Ensure adults are credited for the competencies they have acquired either through formal education or non-formal on-the-job training (accreditation for prior learning).
- Improve the educational opportunity for adults with a low level of education including the prioritisation of general numeric and literacy courses.
- Improve the utilisation of resources in the Danish education and training system.

Adult Education Programmes

These are the two main adult education programmes in Denmark. A brief description of both programmes is presented below.

- (a) Open education is open to all citizens who wish to further their educational attainment and is characterised by the same admission requirements that exist for the primary target market, i.e. 'first-time system applicants'. The programme aims to provide adults with the opportunity to retrace missed learning opportunities or to further educate themselves to a higher level. The programmes in general follow the same principles and provisions that exist for the mainstream education system. However, unusually by for Denmark, participants on this programme are required to pay 20% of the actual costs of the course.
- (b) The further education system for adults comprises of two main alternatives: the first main alternative is a basic education programme (GVU) that enables adults with a low level of education attainment to participate in a second level vocational education programme; the second alternative is aimed at adults who have obtained the educational prerequisites to undertake a Diploma or Master's level course. Adults participating in this second alternative are required to finance their own costs to a greater extent than those participating in the basic level course.

iv OECD (2000) "Thematic Review on Adult Education – Denmark", OECD, Paris.

(vii) Stakeholders in the Danish Education and Training System – Industry Input

The social partners, namely the trade unions and employers, play a leading role in the VET system in Denmark, while the role of the Ministry of Education has gradually become limited to controlling and framework governance. The VET schools have acquired greater autonomy on content, organisational approach and financial management. However, the central objective of maintaining a national standard of qualifications remains firmly in place.

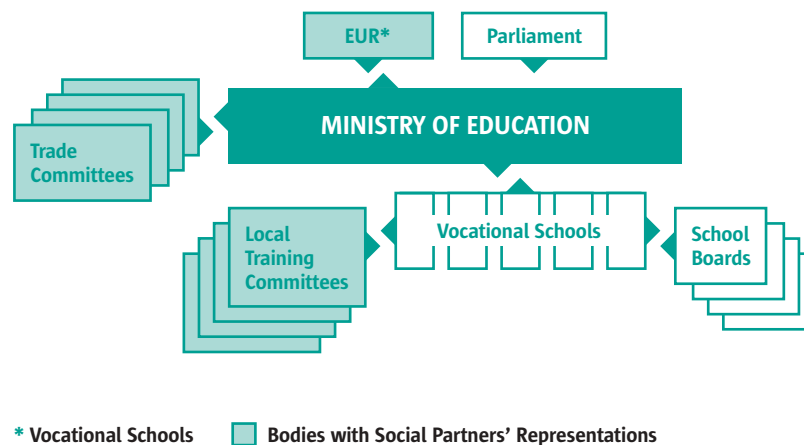
A high degree of co-determination between employers and unions reflects a strong emphasis on finding collective solutions to labour market issues. This tradition of co-determination finds expression in the Vocational Education and Training model that pertains in Denmark. For example, a majority of the members of the Vocational Education Training Council (VETC) are trade union and employer representatives. The Council is the main advisory body to the Minister of Education on objectives and structures, admission requirements, qualification needs, certification and quality issues. Representation of the social partners is equally strong at both the National and Local Trade Committee levels.

The National Trade Committees, provide sector relevant advice on the content, structure, duration and evaluation of programmes and courses.

While at a parochial level, Local Training Committees, assist the schools in planning and content of the programmes. They also provide advise on all matters concerning training and help strengthen contact between schools and the local labour market (see Figure 2).

Similarly, the same close involvement of employers and trade unions extends into the adult vocational training system. The main sources of representation are also found on the National Training Council and the fifteen sub-councils that make recommendations on training requirements in a specific sector and on new training programmes to the Minister of Education.

Figure 2: Major stakeholders in the initial VET system in Denmark



Source: Cedefop (2002).

At university level, the Danish government has recently launched two major initiatives to promote interaction between educators and industry.

1. In November 2001, the Ministry of Science, Technology and Innovation was created. The primary objective of this new Ministry is to promote the interaction of industry with centres for research and education and to strengthen the co-ordination between research, education and industrial policy.

2. In October 2002, the Government announced a programme of reform for the university sector in Denmark. This reform is based on three pillars:
 - Management reform – introduction of industry leaders at various levels at the universities
 - Education reform – ensure broader bachelor degrees and more flexible and modular Master degrees
 - Governance and institutional reform – will ensure the universities self-governing status and greater independence in the planning and organisation of their activities.

The main goal of this reform is to create a broader space for interaction between the universities and the public and private sector.

These reforms envisage that the future principal agents in the area of education, research and industry will be the educators and the business community. Government's involvement would be primarily a supporting role acting as a 'strategic agent' in the capacity of promoting dialogue and goal-setting inside a flexible legal framework.

In 2003, the Ministry will present a separate action plan for increased interaction between knowledge institutions and the business community. It is anticipated that the action plan will specify direct interface linkages that should be cultivated between the two groups.

(viii) Financing the Education and Training Systems in Denmark

In Denmark, education from primary to tertiary level is financed directly by the State. The training system is funded indirectly by the State through levies imposed on employees and employers.

The apprenticeship scheme in the youth VET programme is financed from contributions from all employers through a payroll levy system known as the AER, which was introduced in 1977 under legislation. In 2000, the fund collected a total of €305m. The scheme operates by redistributing money to employers offering apprenticeships from those who do not, thereby acting as an incentive for companies to provide VET apprenticeship opportunities.

The adult VET programme is funded primarily by way of a 8% employee labour market contribution tax levy. However, the funds generated from this levy are also used to fund other labour market initiatives, apart from training, such as unemployment benefit. Under this funding system adult VET courses are free of charge to participants.

At an overall level the Danish education and training system is mainly funded both directly by general taxation and indirectly by levies on employers but particularly employees. This system represents, in effect, a public subsidy to firms to train because the balance of funding falls on the individual rather than enterprises. The economic case for this rests, as the OECD notes, on "the high social benefits accruing from the training of the workforce, especially for an economy with a large number of small and medium-sized enterprises which would not have incentives to undertake this investment without a public subsidy".^v

(ix) Leading Education Establishments in Denmark

A short profile of the activities of the leading Danish education establishments specialising in the food sector is presented below. The profile sets out the various courses on offer, the pedagogical methods employed, the target applicants, duration of the courses and future opportunities for graduates, etc. The main colleges profiled are:

- **Dalum Technical College**
- **Danish Meat Trade College in Roskilde**
- **The Royal Veterinary and Agricultural University.**

A brief presentation of the three establishments is presented below.

v OECD (1996) "OECD Economic Surveys 1995-1996 – Denmark", OECD, Paris.

Dalum Technical College^{vi}

Dalum Technical College is a modern education centre focused entirely on the provision of the food industry courseware from primary processing right through to food service. The college has a strong reputation for providing graduates to the dairy industry. Dalum Technical College is situated in Odense in the heart of Denmark and has a student population of more than 3,000. It offers 28 different trade and academic courses, 12 of which can be completed at the College directly. The remaining 16 courses are completed in co-operation with other educational institutions. In addition, the College offers a small number of courses in English as well as developing tailor-made programmes for overseas participants from countries such as China, USA, Vietnam, Japan, Iran, and Sri Lanka, etc. The college also operates a teacher exchange programme with universities in the USA and Australia.

As a dedicated educational institution focused on servicing the wide needs of the food industry in general, the College believes that it has created an environment that fosters cross-disciplinary capabilities between the food-related courses that enable it to add new dimensions to existing programmes and to respond rapidly to the changing educational and training needs of the industry. This ‘tilling to grilling’ philosophy provides students focusing on either end of the food production chain to appreciate aspects outside their core specialisation. Table 2 below provides an overview of the wide range of courses on offer at the College.

The college recognises that as a food producer heavily reliant on export markets, the Danish industry needs to be able to react quickly to meet the changing needs of the export markets. For example, in the 1970s Feta cheese in Denmark went from being virtually unknown to its most produced cheese, and heavily exported until changes in GATT subsidy policy. These changes resulted in the virtual overnight collapse of Danish Feta exports, as a result of price increases. The industry responded quickly and altered production to Mozzarella, which today is almost the most produced cheese in the country.

Rapid changes, such as the example highlighted above, place heavy demands on the industry. This makes it fundamentally important that a strong training and education system exists to reskill staff and allow the industry to deal with punctuated discontinuities in the market place. The college recognises its role in monitoring and reacting to changes in the environment in order to keep its courses current and relevant.

Dalum Technical College offers three different types of courses: trade, academic and refresher courses.

Table 2: Overview of courses on offer in Dalum Technical College

Trade	Academic	Refresher
Dairyman	Dairy Technologist	International Dairy Courses
Laboratory Assistant	Food Technologist	Specialised courses in the Dairy Industry
Butcher	Process Technologist	Regulatory Technology and Process Control Courses
Bakery	Service Economist	Dairy Foreman Courses
Confectionery	Laboratory Technologist	Courses for the Dairy Labour Market
Chef/Waiter/ Kitchen Assistant		Dairy Safety Courses
Nurseryman/Forester/ Agriculturalist		Laboratory Assistant Courses
		Courses for the Chemical Industry
		Courses for the Hotel and Catering Personnel
		Courses for Canteen and Institution Personnel
		Courses for Bakers and Confectioners
		Specialised Courses for the Catering Industry
		DP Courses
		Agricultural Courses
		Basic Commercial Courses

Source: Dalum Technical College.

vi Information on Dalum Technical College is based on a telephone interview with Mr Paul Stein Jensen, College Director and information on the College website www.Dalums.dk.

The College has a strong reputation in providing high-calibre graduates to the approximately 75 dairies that exist in Denmark. A brief overview of the training and education opportunities available in this sector is presented below. In the dairy industry, there are three levels of education exist: dairyman, dairy technologist and dairy engineer. In addition a variety of basic and refresher courses exist for unskilled workers. Dalum offers courses at the dairyman, and dairy technologist level, in addition to refresher and basic courses to unskilled workers in the industry. Dairy engineers are required to complete a formal five-year university programme. This is also described below.

The Dairyman Education

A dairy apprentice begins his/her education at the age of 17/18. The education takes 3½ years, alternating from college theory to practical work experience in at least two different approved dairies.

The theoretical subjects of the dairyman education concentrate on the following areas: dairy technology, dairy chemistry, microbiology, and process control. Classroom education is supported by practical workshops at the College's own advanced dairy. Upon successful completion of the course, a skilled dairyman is able to handle all functions in connection with the production of dairy products. Approximately, 110 students complete this programme each year.

The Dairy Technologist

In addition to the basic education delineated above, a dairy technologist is required to undertake a further two years of theoretical training. The education programme of a dairy technologist course concentrates on four main areas: basic subjects, dairy technology subjects, subjects related to the operation of dairy plants, and a final thesis. The course is concluded by an exam, after which the student receives a Higher Dairy Technology Diploma.

The aim of the dairy technologist education is to train the person in question to become competent in producing various dairy products and carry out operational and product control, as well as to participate actively in the product development and management functions.

A dairy technologist must be capable of carrying out duties at an intermediate level with regard to production, product development, tests, teaching, and management. This education profile differentiates a dairy technologist from a skilled dairyman on the one hand, and the academically educated engineer or a bachelor/master of science on the other. Approximately 40 dairy technologists graduate each year in Denmark.

The Dairy Engineer

This individual is educated for five years in an university environment. In order to become a dairy engineer (MSc) the student must have passed the upper secondary school exam (science line) and have received practical training before embarking on the actual education at the Royal Veterinary and Agricultural University and Denmark's Technical University, both in Copenhagen.

The student receives his/her practical training at Dalum Technical College and at various approved dairy plants. However, the practical training of the dairy engineer students is concentrated into 6 months.

As part of the five-year programme at the university, dairy engineering students can choose from a series of subjects in the fields of mathematics, chemistry, physics, and biology. The following subjects are compulsory: Dairy product technology, Dairy bacteriology, Dairy chemistry, Milk production, Dairy economy, Dairy plan projecting, and Quality analysis. Having completed the theoretical examinations, students are required to complete a thesis as part of the course. There are approximately 15 dairy engineering graduates each year in Denmark.

The occupational possibilities for dairy engineers are many, both in structure as well as in function. The largest area of employment is in dairy plants, in the service organisations of the dairy industry, and in other private business establishments.

In addition, graduates may pursue further education to PhD level, requiring an additional 2½-3 years study.

Furthermore, The Royal Veterinary and Agricultural University may confer the Doctorate of Agricultural Science on candidates who have carried out scientific research deemed worthy of such acknowledgement.

Refresher courses for all dairy employees

As part of the Danish Government's active role in the ongoing training of the labour market, many of the technical colleges offer basic labour market courses. At Dalum Technical College approximately 1500 dairy workers a year attend basic training courses. Table 3 (below) provides a brief outline of the courses available.

Unskilled dairy workers can participate in a number of these short courses (1-2 weeks) and thus gain a certain degree of competence and skills. The basic courses are specifically designed for this group of employees. The purpose of the courses is to make dairy workers more proficient in carrying out their duties at the dairy plant, and to encourage the workers for further education. Dairy men and dairy technologists can participate in all of the above courses.

Table 3: Basic Courses available at Dalum Technical College

Introduction to the Dairy Industry	Milk Products
Basic Dairy Course, Level 1	Dairy Machinery
Basic Data, Level 1	Quality Control
Quality	Processing Control and Control of Products
Packing	Data and Processing Control
Dairy Hygiene and Control	Acidification and Acidification Problems
Basic Dairy Course, Level 2	Advanced Data and Processing Control
Basic Data, Level 2	Advanced Milk Production
Basic Cheese Production	Milk Collection
Basic Milk Production	

Source: Dalum Technical College.

For the management personnel of a dairy business, Dalum Technical College offer a number of tailor-made 'refresher courses'. These courses are specifically designed for dairy technologists and all courses include a certain element of management.

Table 4: 'Refresher courses' available for Dairy Technologists at Dalum Technical College

Labour Relations	Oral Communication/Assertion Training
Management and Cooperation	Oral Communication/Advanced
Practical Management	The Manager and the Environment
Delegation Techniques	Production and Environmental Control
Presentation and Speech-making Techniques	Quality Control
Chairmanship	Internal Auditing
Problem-solving Techniques	Calibration
Employee Development/Planning of Training	Quality Control and Evaluation of Dairy Products

Source: Dalum Technical College.

The Meat Trade College in Roskilde^{vii}

The Danish Meat Trade College was founded in 1964 by the Danish slaughterhouses, who recognised the need for the development of a formal education and training programme for the future expansion of the industry. Today, the College provides education and training courses to approximately 5,000 students annually, of which 500 are from abroad. In addition, it employs about 350 teachers and support staff, many of whom have extensive experience in international training and education activities through the College's international projects.

The training facilities at the College includes an industrial training and research abattoir, which sells its products under normal business conditions to the local market or as export. Every week approximately 600 pigs and 50 cattle are slaughtered and processed, primarily by the students. The training and research slaughterhouse fulfill all veterinarian and hygienic requirements stipulated by USDA and the EU. In addition, the College has a retail shop and a pilot food production plant for training exercises.

The college offers education and training courses in the following areas:

- Slaughtering of pigs and cattle
- Cutting and deboning of pork and beef
- Meat processing of pork and beef
- Retail meat cutting and processing
- Meat inspection and veterinarian regulations
- Food technology
- Packing technology
- Total Quality Management
- HACCP
- Maintenance
- Production control
- Institutional development.

Courses in the above topics can be taken either individually or as part of a training package. The training focuses on an interaction between theoretical and practical training. Classroom lectures take place on the main college campus while the practical training occurs at the fully equipped industrial research and training slaughterhouse. The practical work is supported by theoretical lessons, during which the trainees are introduced to basic theoretical issues. During the practical training, the trainees take active part in the practical work through the production line, supervised by experienced senior teachers.

International activities

One of The Danish Meat Trade College's objectives is to participate in the development and implementation of training activities internationally, and the College has expanded its international activities considerably. The combination of practical facilities, i.e. the training and research slaughterhouse, and the high level of technical knowledge of the specialist teachers has placed the Danish Meat Trade College in a strong position to offer international training activities.

vii Information on the Danish Meat Trade College is based on a telephone interview with Mr Henrik Bengtsson, College Director, supplemented by college information literature.

These activities are developed in close co-operation with the client and are specifically designed around the training needs and requirements of the trainees. The training is often based upon the principle of 'training the trainer'. The actual training may take place at The Danish Meat Trade College's facilities or the client's premises abroad, depending on which solution best meets the specific training requirements. Past clients of the College include Glanbia and Galtee Meats in Ireland and Grampian in the UK.

Furthermore, in pursuit of its desire to 'internationalise' its outlook, the College has co-operated with multilateral world-wide organisation and aid programmes, such as FAO, DANIDA, UNDP, EBRD, Phare programmes and Tacis programmes. It is currently working to develop an international VET slaughtering course lasting 3½ years designed for international students.

The Royal Danish Veterinary and Agricultural University^{viii}

The Royal Danish Veterinary and Agricultural University, known as KVL was founded in 1853 and is located in Copenhagen. The college offers a wide variety of courses in the natural sciences from undergraduate up to PhD level. The university has thirteen departments, including the Department of Dairy and Food Science (DDFS).

The DDFS offers two study programmes in co-operation with the Danish Technical University. The two study programmes on offer lead to degrees in Food Science and Technology; a BSc programme which is a three-and-a-half year course and an 'add-on' MSc qualification involving an additional two-year graduate programme. The Danish Technical University programme has an intake of 30 students per year, compared with KVL intake of 60. Over the years, both Universities have strengthened their links and students now share semesters between the two institutions.

Most students that complete the Bachelor programme tend to go on to the Master's programme. In the MSc programme candidates are offered the opportunity to specialise between Dairy, Meat and Food Sciences and Technology. A graduate programme in human nutrition is also offered by the Department of Human Nutrition at KVL. In addition, a 3-year PhD programme is offered by the Department. Approximately 300 Food Science students are enrolled at KVL, and approximately 40 PhD students are employed at the Department of Dairy and Food Science.

In terms of research activity, the University is heavily involved through its role in the Center for Advanced Food Studies, which co-ordinates research between the KVL and the Technical University of Denmark. The research undertaken at the Centre focuses on seven areas: Food Microbiology, Food Chemistry, Food Technology, Sensory Science, Fruit and Vegetable Science, Meat Science, and Dairy Science.

The aim of the research is to increase knowledge and understanding relating to the production of food with high sensory and nutritional quality. The research programmes are financed from a number of sources including the Danish Government, EU studies, as well as industry sponsored programmes.

In addition, KVL provides a wide range of short-term specialised courses offered to students as electives and to external individuals, subject to demand. A list of these courses is provided below.

^{viii} Information on The Royal Danish Veterinary and Agricultural University's Department of Dairy and Food Science is based on a telephone interview with Dr Grete Bertelsen, Head of Department and supplement with information on the College website, www.mli.kvl.dk.

Table 5: Specialised Food Courses offered at KVL

Name of Course	Duration
Advanced Chemometrics in Food Science	3-week course
Oxidative Changes in Food	Semester course
Water in Foods	Semester course
Food Mycology	Semester course
Fundamental Principles of Meat Quality	Semester course
Fresh Meat Production	Semester course
Microbiological Aspects of Food Preservation and Quality Assurance	Semester course
Introduction to the Fermentation Process	Semester course
Fermented Foods	Semester course
Confectionery & Beverages	Semester course
Plant Food Products	Semester course
Explorative Data Analysis/Chemometrics	Semester course
Dairy Technology	Semester course
Dairy Microbiology	Semester course
Quality Management & Food Legislation	Semester course
Food Chemistry	Semester course
Raw Milk	Semester course
Food Plants as Raw Material	Semester course
Meat as a Raw Material	Semester course
Food in Relation to Society	Semester course
Advanced Sensory Science	Semester course
Introduction to Food Production	3-week course
Food Packaging	3-week course
Functionality & Functional Ingredients in Foods	Semester course
Sensory Science	3-week course
Natural Antioxidants	Theme course

Source: Royal Danish Veterinary and Agricultural University.

(x) Summary

Denmark plays a leading role in the international food industry, with substantial export volumes. The heavy investment in the Danish education and training system is seen as a means of deepening the knowledge base and securing the future competitive position of its food industry.

A defining characteristic of the Danish education and training system is the high level of co-determination between employers, trade unions, education institutions and the government. This gives rise to a system that has the flexibility to adapt to the changing needs of industry and workforce.

Moreover, both the initial and adult education and training systems provide flexible and well structured opportunities for those working in the food industry. These courses range from specialised Bachelor and Master's level degrees to more general vocational programmes aimed at providing proficient manual and skilled labour to the industry.

Finally, it should be noted that the dairy industry in Denmark, which is comprised of approximately 75 dairies and employs 10,000 people, has recognised that it must compete against other sectors of the economy in order to attract high calibre employees. In recognition of this imperative, the industry has taken steps to make young people interested in pursuing a career in the sector. These steps include marketing campaigns in newspapers and magazines, presentations at schools and other highly visible media to promote a career in the industry. These efforts help to maintain a certain prestige in being employed in the dairy and wider food processing sector. This is considered important in ensuring a sufficient flow of high-calibre graduates to the industry.

Appendix 7.2

Education and Training Services in Finland – Key Lessons for Ireland

Finland

Introduction

This appendix profiles the education and training systems in Finland. The profile is presented under the following headings:

- (i) Size/Importance of the Food Processing Sector
- (ii) Key Development Agencies in the Food Processing Sector
- (iii) Background Structure to the Education and Training System
- (iv) The Upper Secondary Level
- (v) Higher Education
- (vi) Adult Education
- (vii) Stakeholders in the Education and Training System
- (viii) Financing the Education and Training System
- (ix) Leading Education and Training Establishments in Finland
- (x) Summary.

(i) Size/Importance of the Food Processing Sector

The food industry is an important sector of the Finnish economy. It is the fourth largest industrial segment, after metal engineering, forestry and chemical industries. The gross value of food production in 1999 was €8.08 billion giving rising to employment levels of 42,000.

The main areas within the Finnish food industry are meat processing, bakery products, dairy and fruit and vegetables. Around 85% of the food consumed in Finland is produced nationally. The value of exports in 2001 was nearly €1.0 billion and comprised of a wide range of products such as cheese, sucrochemical products, butter and other milk fats. Imports for the same period were more than double exports at over €2.0 billion and comprised of cheese, modified starches, fish products and confectionery.

Since the 1970s, Finland has been identified as a pioneer in the research of functional foods. Current moves by leading Finnish companies suggest that the industry aims to consolidate its early competitive advantage in the area of functional foods.

(ii) Key Development Agencies in the Food Processing Sector

The following agencies were identified as the main organisations with a role in the development of the food industry in Denmark:

- Ministry of Agriculture and Forestry
- MTT Agrifood Research Institute
- Centre of Expertise for Food Development

- The National Food Agency
- Finnish Meat Research Institute (FMRI)
- Ministry of Education
- The National Board of Education
- The Higher Education Evaluation Council
- Tekes
- Finpro.

Ministry of Agriculture and Forestry

The Ministry of Agriculture and Forestry plays an important role in the health and safety of foodstuffs in Finland. The Ministry's main areas of responsibility include the development of the rural environment and the administration of various EU grant assistance programmes.

MTT Agrifood Research Finland (MTT)

MTT Agrifood Research Finland is the largest research institute in Finland and one of the largest in Nordic countries carrying out agricultural and food research. It operates in twenty locations throughout Finland and is headquartered in Jokionen, 120 km north west of Helsinki. As part of a broad research agenda, the institute undertakes research in the areas of food technology, microbial biotechnology and food chemistry. The focus of this research is on the development of health-promoting foodstuffs. The institute, which operates under the aegis of the Ministry of Agriculture and Forestry receives its funding from central government, EU programmes and private industry.

The Centre of Expertise for Food Development (ELO)

The Centre of Expertise for Food Development is a national network that seeks to improve the competitiveness of foodstuffs production in Finland. Its main target group of companies is both emergent and established SMEs. The ELO seeks to involve businesses that have not been accustomed to using research and development services.

The Centre aims to meet the needs of business and to raise the national competence of the food sector in the following areas:

- Improvement of the processing level of foodstuffs production
- Exploitation of the strengths of Finnish foodstuffs
- Management of a customer-centred chain of commercialisation
- Promote both national and international networking and co-operation
- Exchange of information and expertise.

The Centre of Expertise for Food Development takes the form of a network of five research institutes and seven regional centres covering most of the country. Figures 1 illustrates the five research institutes and their respective research specialisations.

Figure 1: Food Research Institutes in Finland

	RESEARCH INSTITUTE	RESEARCH SPECIALISATIONS
Centre of Expertise for Food Research	University of Helsinki	Foodstuff technology, food quality and safety, cereal and meat technology, use of beneficial bacteria in foodstuffs, food economy, packaging technology and service unit for small enterprises in the foodstuffs sector
	University of Kuopio	Links between national diseases and nutrition, agro-biotechnology, research into health impacts and safety of foodstuffs, new foodstuffs
	Agricultural Research Centre	Nutrients and foreign substances in foodstuffs and diets, research into milk and dairy products, molecular genetics of lactic acid bacteria, egg research, biomolecules of plant origin and vegetable fermentation
	University of Turku	Nutrients and foreign substances in foodstuffs and diets, research into milk and dairy products, molecular genetics of lactic acid bacteria, egg research, biomolecules of plant origin and vegetable fermentation
	Technical Research Centre Finland	Cereal Technology, enzyme technology, yeast fermentation, bakery clinic, industrial microbiology, packaging technology, packaging clinic, fish research, soft processing technologies, research into foodstuff structure, industrial hygiene

Source: Finnish Centre of Expertise for Food Development, PwC.

In the case of the seven Regional Centres, the main focus of attention is the dissemination of knowledge between the Research Institutes and local industry. This includes the commercialisation of research breakthroughs into products. In addition, the Regional Centres provide training and education opportunities to industry. Figure 2 provides an overview of the regional centres and their individual areas of specialisation.

Figure 2: Regional Centres of Expertise

South Savo Foodstuff Network	Biodynamic research and production, training and counselling, berries and herbs, product differentiation, small-scale foodstuffs reprocessing, product development and environmental expertise in the foodstuff sector
North Savo Foodstuff Network	Foodstuff product development, marketing support services, layout and equipment design, improvement of berry enterprise, berry reprocessing and logistics chains, milk production and reprocessing, reduction of environmental impacts of the foodstuffs industry
Kainnu Foodstuff Network (MTT)	Reprocessing of milk into special products and biotechnology of dairy products, cultivation of herbs and spices and development of re-processing, wild berries and fungi
Satakunta Foodstuff Network	Improvement in field vegetable production, processing, marketing between small producers, supplementary training and development projects for the foodstuffs industry
Mid-Häme Foodstuff Network	Technology transfer and commercialisation, information management training and marketing; meat technology, quality of meat products and operations, efficiency of meat production chain, training services of the meat industry educational institute
Uusimaa Foodstuff Network	Product development, training, quality control, marketing; and meat and meat products, production of dairy and cereal products, and other foodstuffs
South-West Finland Foodstuff Network	See University of Turku as a National Research Centre

Source: Finnish Centre of Expertise for Food Development, PwC.

Each node of the network has its own national specialisation, while the network as a whole is co-ordinated by a special purpose company owned by the State known as Agropolis Ltd. The work of the nodes falls under three general headings: pure and applied research, sectoral development and enterprise service centres. Most of the network nodes provide laboratory and pilot services.

The National Food Agency

The National Food Agency was established by the Ministry of Agriculture and Forestry in March 2001. It is an independent body, with overall responsibility for food safety and control, throughout the food industry value chain.

Finnish Meat Research Institute (FMRI)

The Finnish Meat Research Institute in Hämeenlinna, the provincial capital of south Finland and 100 kilometres from Helsinki, carries out scientific research in the meat industry. The institute is controlled by the Finnish meat industry and provides advice and consultancy services to its members.

The Ministry of Education

The Ministry of Education has overall responsibility for the provision of education and training in Finland. The Ministry's sphere of authority includes education, research, youth affairs and employment training. The Ministry prepares legislation and government resolutions concerning educational matters in Finland.

The National Board of Education

The National Board of Education is an expert body responsible for the development of education objectives, contents and methods in basic, general upper secondary, adult education and training. The main responsibilities of the Board are the preparation of core curricula and evaluation of the Finnish education system. The main social partners such as the trade unions and industry are represented on the National Board of Education. Responsibility for the evaluation of polytechnics and the universities rests with these institutions themselves and they are supported by the Higher Education Evaluation Council operating under the Ministry of Education.

The Higher Education Evaluation Council

The Finnish Higher Education Evaluation Council is an independent expert body assisting the universities, polytechnics and the Ministry of Education in matters relating to evaluation. In addition to evaluations of third level institutions, the Council provides advisory and consultancy services on matters of educational best practice.

Tekes – the National Technology Agency

Tekes, the National Technology Agency, finances Research and Development (R&D) projects of companies and universities in Finland. The funds are awarded from state budget via the Ministry of Trade and Industry. The main objectives of Tekes are to increase exports, broaden the industrial base, create new jobs and contribute the improved welfare of Finnish society.

In 2001, Tekes in co-ordination with the Finnish Food and Drink Federation launched a four-year €50m innovation fund concentrating on the links between food and health. The aim of the research is to promote consumer-oriented product development and the commercial application of new food technologies to help reduce the risks of heart disease, cancers and digestive problems.

Finpro

Finpro is the primary body responsible for providing assistance in the development of overseas markets for Finnish enterprises. It was established by private enterprise in 1921 to promote exports, primarily of an agriculture and food product nature. In 1970, the Finnish government formally entrusted the responsibility of “planning, preparation and execution of export promotion activities” to Finpro. The organisation is co-financed on an equal basis by government and industry. Today, its activities have expanded to include all internationally marketable goods and services. The role of Finpro has shifted from “export facilitator to internationalisation expert”. The key objective is to accelerate the internationalisation of Finnish companies while minimising the risks involved, by harnessing its own resources and co-operating with other organisations with related goals such as Tekes (National Technology Agency), Finnvera plc (the Employment and Economic Development Centres), Sitra (Finnish National Fund for Research and Development).

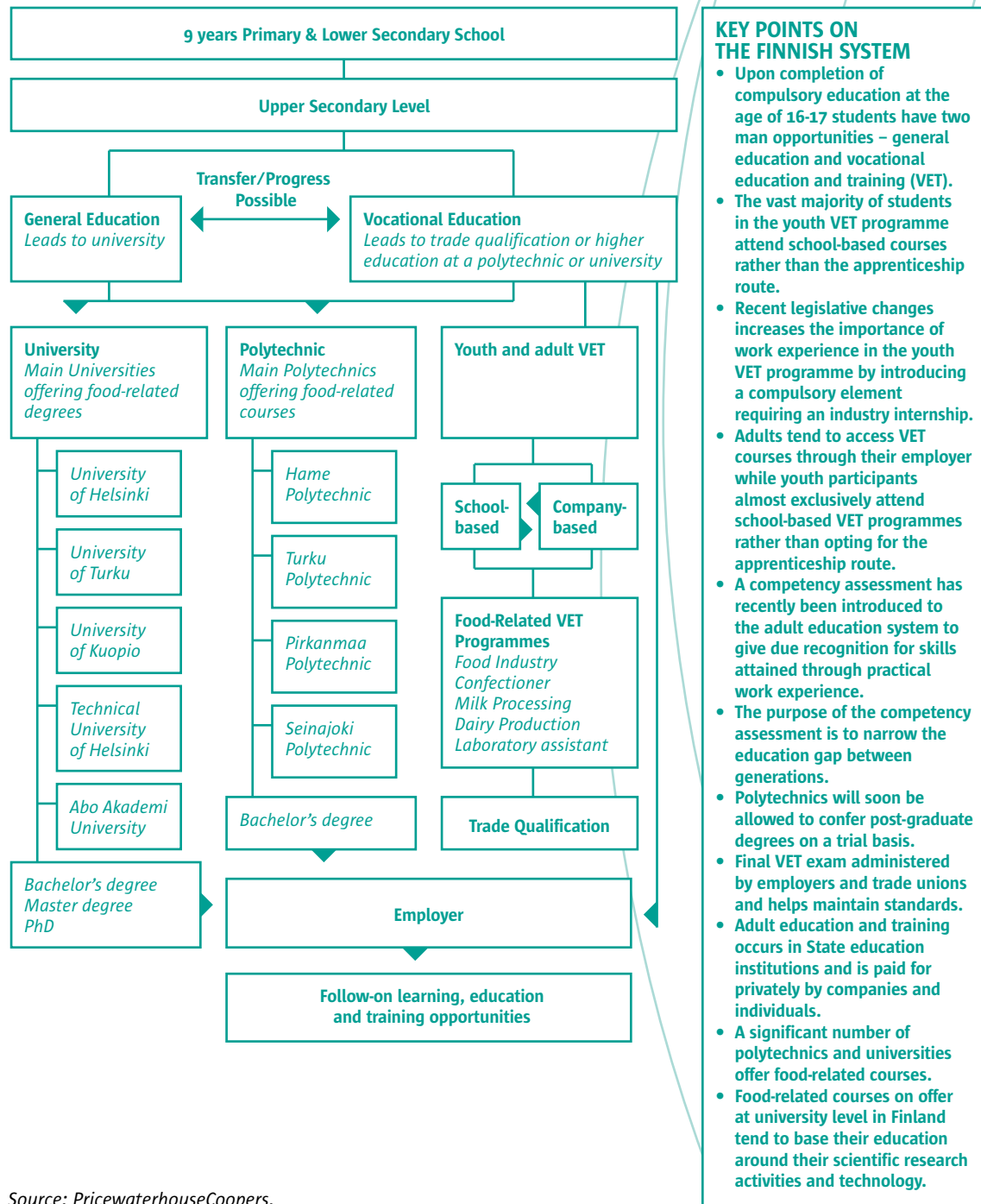
(iii) Background Structure to the Finnish Education System

The Finnish education system shares structural features similar to the Irish system (see Figure 3 below). Within the Finnish system there are a number of interesting features of relevance to the food industry. These include:

- school-based vocational education and training programmes specifically developed for careers in the food industry;
- a polytechnic system introduced in the 1990s offering non-university degree programmes including food-related programmes;
- strong focus on science and technology in third level curriculum;
- a national network co-ordinating food research in the polytechnics and universities with the needs of the food industry; and
- a national fund supporting research into food and health and promoting linkages between industry and educators.

A brief outline of the education and training architecture in Finland follows below – the context in which the provision of learning programmes in the food sector operates.

Figure 3: Diagrammatic Overview of the Education and Training System in Finland



Source: PricewaterhouseCoopers.

(iv) The Upper Secondary Level

Upon completion of the compulsory education programme at the age of 16, students can pursue one of two main options; (a) 'general' education usually leading to university/polytechnic studies or (b) a vocational education and training programme leading to a trade qualification but can also provide further education opportunities at polytechnic/university level. A short description of the both programmes is outlined below.

(a) General education programme

The general education programme can be accessed by all students who have successfully completed the compulsory programme, which lasts for three years. The programme requires the completion of at least 75 courses (the average length of one course is 38 hours).

Finnish students are not tied to 'class years'. Instead, students may choose when to take a course provided by the school. In other words, a student's progress through the upper secondary level is not measured in form years. In practical terms the system provides students with the opportunity to choose the timing of courses that best suits their needs. Students must complete the syllabus within a maximum of four years and a student may only be granted an extension of the completion period by exception.

Upon completion of the general upper secondary programme, students sit the matriculation examination, which provides general eligibility for further studies at institutions of higher education. The matriculation examination is held in the spring and the autumn and students may complete the examination either in parts or entirely in one examination period.

The language of instruction at an institution providing general upper secondary education is either Finnish or Swedish.

(b) Vocational Education and Training

Major reforms of the VET system at both a secondary and tertiary level were introduced in the late 1990s. The core principles of the reform included extending the range of the qualifications, increasing on-the-job training and improving links between schools and employers, thus promoting employment.

Other reforms of the VET system include the abolition of divisions between institutions according to their field of education and the extension of the programme to a minimum of three years. Hitherto, schools were very restricted by their 'education licence' in providing instruction outside of their education charter, granted by the Minister of Education. VET schools have now become larger and more multidisciplinary in form.

In 2001, all programmes leading to upper secondary vocational qualifications were extended to a minimum of three years and include a period of on-the-job learning with a minimum duration of six months. On-the-job learning is agreed through a written contract between the workplace and the education provider. As a rule, on-the-job learners do not have contracts of employment with the employers.

The training on offer in Finland covers many branches of trade and industry. The programme can be broken down into seven sectors:

- Natural resources sector;
- Technology and transport sector (includes food sector);
- Business and administration sector;
- Tourism, catering and home economics sector;
- Health and social services sector;
- Culture sector;
- Leisure and physical education sector.

Students receive basic general and vocational skills on all VET programmes as well as specialised vocational expertise in a particular field. Within the technology and transport sector students have the opportunity to choose between the following food-related specialisations:

- Food Industry
- Confectioner
- Milk Processing
- Dairy Production
- Laboratory Assistant.

The reformed upper-secondary vocational qualifications include a demonstration requirement to prove the achievement of the objectives of vocational studies. These skills demonstrations are planned and organised in co-operation with businesses and other representatives of working life.

All vocational qualifications available at educational institutions in Finland may also be obtained through apprenticeship training. However, in practice the vast majority of students in Finland have tended to access the VET programme through the school-based route rather than through apprenticeship training. The latest available figures indicate that the annual number of students enrolled in all industry apprenticeship programmes in Finland (including the food processing industry) was 610. Owing to the very small numbers involved in the apprenticeship route a detailed description of the programme is not provided.

Finally, it is worth noting that in Finland, lecturers in the VET programme are encouraged on their own initiative to participate in industry work opportunities during their student's own practical training periods. The vocational institutions recognise that information tied to a practical occupation can become outdated more rapidly than purely theoretical and general information and therefore encourage staff members to supplement and update their own competence.

(v) Higher Education

The concept of higher education was defined in very narrow terms in Finland up until the 1990s. The system was primarily university-based with very limited opportunities in higher vocational education. The university model was firmly rooted in a didactic model focused on education through research.

In the early 1990s, the Finnish government saw the need to reform and develop the non-university higher education system. The goals included raising the level of education and upgrading vocational post-secondary education into higher education degrees. A total of 22 temporary polytechnics (institutions of vocational higher education) were established by combining 85 educational institutions, which had previously provided vocational post-secondary education by upgrading their education to meet the standards of higher education.

Today, the system has evolved into two distinct models; (a) vocationally-oriented third level institutions and (b) traditional academically-oriented universities.

(a) Vocational Education and Training at Third Level

Based on the early success of the polytechnics, the government decided to make the system permanent in 1995. In August 2000 there were twenty-nine permanently licensed polytechnics in Finland.

Polytechnics usually offer teaching in a number of different fields. Polytechnic students complete higher education degrees with a professional emphasis: the starting points for the development of these degrees include the requirements and needs of working life, such that graduates are capable of undertaking expert functions in the workplace. The minimum and maximum scopes of polytechnic degrees are mainly three and four years respectively.

In addition to education leading to polytechnic degrees, polytechnics organise adult education. They can also carry out research and development work that serves polytechnic education and supports working life.

The general requirement for admission to polytechnics is successful completion of general or vocational upper secondary education.

Developing on from the vocational education and training programme at the upper-secondary level, Polytechnics in Finland provide education in the same educational sectors, namely:

- Natural resources
- Technology and communications
- Business and administration
- Tourism, catering and institutional management
- Health care and social services
- Culture
- Humanities and education.

In July 2001, the government decided to extend the authority of the polytechnics on a trial basis to offer postgraduate degrees. The polytechnics could begin to offer postgraduate degree programmes from 1 August 2002. An assessment of the trial's success will be conducted three years hence.

The polytechnic postgraduate degree is a new type of degree aimed at people who have completed a polytechnic degree or other applicable higher education degree, and have a minimum of three year's work experience in the field after the completion of the degree. The new higher education degree is determined on the basis of working life needs and is implemented in line with adult education goals.

A large proportion of food-related higher education programmes in Finland have a high technology/science focus. Typical examples of this are the courses on offer at Turku and Hame Polytechnics, which offers degree courses in biotechnology and food technology (discussed in more detail in Part (ix)).

(b) University Education

There are 20 universities in Finland comprising a student population of 160,000. Of these, half are traditional multidisciplinary universities and the other half are specialised institutions.

The Finnish matriculation examination provides general eligibility for university education. In addition, those with a Finnish polytechnic degree, post-secondary level vocational qualification or at least a three-year vocational qualification also have general eligibility for university education.

As a result of their autonomy, universities themselves decide on the intake of students according to their resources.

In recent years, universities have strengthened their contacts with working life. According to the new legislation governing universities, university boards may include people who work outside the university. Continuing education centres of universities promote the universities' contacts with working life, as do the newly established recruitment and career planning services. The recent expansion of university research activities has helped reinforce co-operation between the universities and industry.

The Finnish government has established a number of national Centres of Expertise, which are intended to be catalysts where high-quality research, industry and international competitiveness are combined and used for the development of local enterprises.

Finnish universities have an international record in food-related research. These research activities are partially funded by Tekes, the National Technology Agency under a four-year €50m innovation fund concentrating on the links between foods and health. The aim of the research is to promote consumer-oriented product development and the commercial application of new food technologies to help reduce the risks of heart disease, cancers and digestive problems.

University and polytechnic research programmes in Finland are co-ordinated by The Centre of Expertise for Food Development (known as ELO) – a national network that seeks to improve the competitiveness of foodstuffs production in Finland (discussed earlier in Part (ii)). The ELO co-ordinates the activities of State-sponsored research and education programmes with the needs of industry. The network acts as a conduit for knowledge transfer in food-related research.

Similar to the polytechnics, food-related degree programmes at Finnish universities places a firm emphasis on technology and science. For example, the Universities of Helsinki, Turku and Kuopio all focus very heavily on the scientific properties of food and various aspects of the nutritional/medical characteristics of food. Typical subjects on a food science degree in Finland include: human nutrition, food chemistry, food technology (with the option to specialise in dairy, meat or cereal technology) food microbiology, food economics and marketing.

(vi) Adult Education and Training

Adult education and training in Finland can be divided into either one of two categories namely, certificate-oriented or non-formal. Upper secondary vocational education and training tends to be certificate-oriented, whereas additional vocational training may be either. Certificate-oriented education is regulated nationally, under the same system that regulates the initial vocational education and training programme. The qualifications in vocational adult education and training are mainly taken in the form of competence-based qualifications. Under this system adult students are required to demonstrate their vocational skills in competence tests regardless of how and where they have acquired the skills. The aim of competency assessment is to narrow the generation gap in educational attainment and to formalise and update vocational skills in adults to a national quality assured standard.

Adult education and training courses in Finland can be accessed at a wide variety of locations including youth VET Centres, adult institutions for education and training, universities, polytechnics, as well as private training and education companies.

Certificate-oriented adult education is free of charge corresponding to the position in the initial youth VET programme. Conversely, the majority of other adult education provision requires participants to pay a fee. The rate can vary from an administrative charge to full commercial rates, depending on the nature and type of course.

While it is difficult to identify statistics for adult education and training in the food processing sector, at a general level in-service training accounts for the largest number of participants and appears to be an important feature of the Finnish labour market. In 2000, more than 43% of Finnish workers participated in in-service training, with an average training duration of 4.0 days.

Table 8.2: Employee Participation in In-service Training 2000

Employees Total	Employees receiving in-service training	Proportion of all employees %	Training days per participant
2,006,000	869,000	43.3	4.0

Source: Statistics Finland.

(vii) Stakeholders in the Education and Training System

The overall responsibility for the development of adult education and training rests with the Ministry of Education. The Ministry's domain includes the preparation of legislation and general decisions concerning training and education.

In Finland, legislation in the VET system provides that special attention should be focused on working life needs in education. Education must be organised in co-operation with representatives of business life and other sectors of working life. The most important channels through which the social partners and representatives of business life can participate in the planning of vocational education and training are the industry-specific training committees and the Advisory Board for Educational Co-operation.

Both of these committees play an important role in various aspects of the development of upper secondary and additional vocational education and training for young people and adults.

The role of the Advisory Board for Educational Co-operation include the chairs of the industry-specific training committees and representatives appointed by employer and trade union groups.

The task of the Advisory Board for Educational Co-operation is to consider an extensive range of issues that go beyond the boundaries of the educational field and, for this purpose, to:

- monitor, evaluate and anticipate the overall development of vocationally oriented education and training and competence required in working life;
- organise joint workshops and information meetings of the training committees;
- perform any other duties assigned by the Ministry of Education.

The industry-specific training committees play a similar role to the Advisory Board dealing with training issues at a industry-specific level.

At a higher education level, recent legislation allows for industry representatives to be elected on to the governing bodies of universities. However, no specific requirement is made in this regard. In Finland, it would appear that the relationships between universities and industry develop at a local rather than a national level. These relationships tend to be built quite strongly around research collaboration activities. The Centre of Expertise for Food Development, discussed earlier, is a regional network that seeks to link the education and research activities of the universities and polytechnics with industry.

An example of a local initiative linking industry with educators is the Functional Food Forum established by the University of Turku. The primary purpose of the Forum is to provide industry with a platform to harness the research expertise of the University and to develop new products (see University of Turku).

(viii) Financing the Education and Training System

At most education levels instruction is usually free of charge in Finland. The main exception is non-accredited adult education and training. The majority of adult education organisations in Finland receive support from public funds, irrespective of their form of ownership. Some adult education institutions finance their activities by selling educational services to both the public and the private sector. Apprenticeship training in Finland is almost entirely the domain of adult VET rather than initial VET programme. The apprenticeship model is financed almost entirely by the State: providers of apprenticeship training receive grant aid subsidies.

In-service training falls outside public funding and regulation to a large degree; the expenses are usually covered by the employer. In-service training is primarily short-term supplementary training and employees are trained according to the company's own operational needs. Employees usually receive normal salary for time spent training and participation in the training is decided by the employer.

(ix) Leading Education and Training Establishments in Finland

A short profile of the main education establishments involved in the provision of food-related education and training in Finland is presented below. The profile includes details of the various courses on offer, didactic methods, target applicants, duration of the courses and future opportunities for graduates. The main colleges profiled are:

- Turku Polytechnic
- Hame Polytechnic
- University of Turku
- University of Helsinki.

Turku Polytechnic

Turku Polytechnic is based in the town of Turku, 160 kilometers west of Helsinki. It offers a variety of BA and BSc programmes in the following disciplines:

- Arts and Media
- Business and Administration
- Hospitality Management
- Healthcare and Social Science
- Natural Resources
- Technology.

Within the technology discipline, the College offers two food-related specialisations; biotechnology and food technology. The programme is run in close collaboration with companies and research centres in Finland. Participation in real life projects is an integral part of the courses culminating in the final degree work carried out in one of the partner companies of Turku Polytechnic. Both of the degree programmes last four years and upon successful completion graduates are awarded a Bachelor of Science degree.

(i) Biotechnology

Biotechnology focuses on studies of organic life, chemistry and microbiology. Subjects include cellular and molecular biology, gene technology and industrial hygiene. Annual enrolment on this course average between 25-30 students.

(ii) Food Technology

Food Technology concentrates on raw materials, their chemical composition and nutritional impact, food processing and environmental engineering including design of facilities and equipment. The college has an annual enrolment of 50 students in this programme.

Career opportunities are presented by the growing international foodstuffs industry in the areas of management, process engineering and biotechnological production.

Hame Polytechnic

Hame Polytechnic is located approximately 100 kilometres north of Helsinki. Similar to other polytechnics in Finland, the College offers a wide variety of courses in different disciplines ranging from business and administration to technology and communications. With the technology and communications arena the College offers a degree programme in Biotechnology and Food Engineering. This programme was introduced in 1997. The degree programme has three specialisation lines: Food Engineering, Dairy Technology and Environmental Engineering.

The four-year degree in Biotechnology and Food Engineering includes a wide variety of subjects from general studies such as entrepreneurship and communications to professional studies in chemistry, microbiology and process technology. During the programme, students are expected to undertake two summer semesters of work experience and a final placement within the food industry, culminating in a thesis focusing on a practical problem faced by the food company.

The Bachelor's Degree in Biotechnology and Food Engineering prepares graduates for several tasks in different areas of food and related industries. The tasks can be among plant designing, research and development, processing and administration. Students can specialise, for instance, in dairy, meat, brewing or winery technology, or environmental biotechnology.

Hame Polytechnic is the only college in Finland, apart from the University of Helsinki offering a specialisation in the dairy and meat sector. The polytechnic maintains a close connection with employers in these sectors to ensure that their course remains relevant and up-to-date. In addition, the College actively engages in developments at the Mid-Hame Research Institute (see Figure 8.1), which houses the industry-financed Finnish Meat Research Centre. The location of the meat research centre in Hame was an important consideration in Hame Polytechnic developing its food-related courses.

In addition to the higher education level course in Biotechnology and Food Engineering, Hame Polytechnic provides a three-year upper secondary VET programme on dairy technology. The Polytechnic is unique in Finland in this regard, providing education and training at both the upper-secondary and higher education levels.

Both the degree and upper-secondary programme take advantage of state-of-the-art facilities, which include fully-automated pilot production dairy and meat facilities as well as associated manufacturing and laboratory facilities for dairy products such as yoghurt, butter, cheese, ice-cream, etc.

University of Turku

The University of Turku is located in the south west of Finland, approximately 160 kilometers from Helsinki. The university has six faculties including the Faculty of Mathematics and Natural Sciences. Within this faculty there are eight departments including the Department of Biochemistry and Food Chemistry.

The Department of Biochemistry and Food Chemistry was founded in 1957 by Professor Emeritus Veikko Nurmikko, a research collaborator of Nobel Laureate Mr Atturi Virtanen^{ix}. Today, the Department offers BSc, Master's and PhD programmes in biochemistry, biotechnology and food chemistry. A brief overview of the activities of these three main strands of the Department is presented below.

(i) Biochemistry

Biochemistry is the oldest unit of the department. The unit comprises of approximately 50 teaching staff, research scientists and PhD students. The research topics include gene expression, applied microbiology, protein structure/function relationship, enzymology, immunodiagnosics and environmental biochemistry.

(ii) Food Chemistry

Food Chemistry unit within the Department works very closely with the Biochemistry unit. In 1970 the Food Chemistry unit established *FoodChem Turku*, a Food Chemistry and Functional Food Research Centre. The objective of the research centre is to examine the chemical composition of foods and their raw materials related to their nutritional, sensory, microbiological and biochemical properties. It has an international reputation in the area of lipids and pre and pro-biotic research. The other main areas of research specialisation include aroma compounds and sensory quality and development of special analytical techniques such as chromatography/mass spectrometry and supercritical fluid technologies. The Food Chemistry Unit has recently established a Professorship in Food Development to underpin its work in this area.

^{ix} Mr Atturi Virtanen also headed up the R&D department of Valio Co-Operative – a large scale dairy company in Finland, noted as being a European leader in the development of new functional food products.

(iii) Biotechnology

The Department of Biotechnology was established in 1989. In June 1992, the Department moved into its own laboratory and teaching facilities, known as Biocity. This has become one of the main research centres focusing on biotechnology research in Finland.

The Centre is run in collaboration with the nearby Swedish-speaking Abo Akademi University and undertakes research in the areas of biochemistry, biotechnology and food chemistry. The Centre maintains strong-links with surrounding industry and community through its designation as both a research institute and one of the seven regional centres forming the network of expertise in the food industry (see Figures 1 and 2). The Centre undertakes basic and applied research projects in the area of biology, biotechnology, protein chemistry, food chemistry and functional food technology. In addition, the University has close connections with the University of Columbia in the United States, which operates a similar research centre.

The main focus of the Department of Biochemistry and Food Chemistry is the advancement of the University's reputation in both basic and applied research. Increasing the number of Bachelor degree graduates is not seen as a major goal. Instead, the development is on encouraging existing undergraduates to pursue Master's and PhD level education. The pedagogical model reflects the important role that practical research plays in the Department of Biotechnology and Food Chemistry. Due to the multi-disciplinary characteristics of this area of science, aspects of other programmes including a recently established graduate degree in Health and Biosciences are included in the primary degree programme.

In March 2002, the University established a Functional Food Forum, a research and development centre focused on providing state-of-the-art research expertise in the natural, health and medical sciences to develop and commercialise functional foods for human needs.

The purpose of the forum is that, through co-operation with the food, medical and healthcare industries, the University can lend its expertise in research and development in assisting the speeding up of the commercialisation process both on domestic and international markets.

University of Helsinki

The Vikki Campus of the University of Helsinki is one of the largest centres of biosciences in Europe. The Campus, which specialises in food sciences operates in a multi-disciplinary environment comprising of two faculties, Agriculture and Forestry and Faculty of Veterinary Medicine and several University Departments including Food Technology and Nutrition, Food and Environmental Hygiene, Economics and Management, Biochemistry, Microbiology, Plant Physiology. The campus also houses an Institute of Biotechnology.

The Food Science programme at the Vikki Campus comprises a variety of disciplines from the University Departments listed above, to form a 'virtual' Department. The programme offers a BSc and Master's programme in Food Science with subject areas including human nutrition, food chemistry, food technology (with the option to specialise in dairy, meat or cereal technology) food microbiology, food economics and marketing. The majority of students who graduate from the BSc programme tend to go on to pursue the Master's programme.

The Food Science programme has a total of 400 students and enrolls about 80 new students a year. It employs 120 staff, including 13 professors and 15 other academic staff. In addition, Food Sciences has more than 60 PhD students and research workers paid by external funds. The Campus has the largest concentration of food research staff in any university in Finland.

Research conducted at the Vikki Campus focuses on various aspects of food quality and the health-promoting role of food. More specifically research areas include lactic acid bacteria in food and food processing, physiochemical properties of food, meat and meat product quality, sensory and consumer research, cereal technology. The college maintains strong collaborative links with other research institutes including: Helsinki University of Technology, Technical Research Centre of Finland (VTT)/Biotechnology and the National Public Health Institute.

The University has recently made several large profile investments at the Vikki Campus to strengthen its future role in food sciences. New state-of-the-art facilities comprising laboratories, education and library facilities were opened in 2002, with further expansion planned for 2003. Moreover, the Finnish Government has lobbied intensely at EU level for the recently established European Food Safety Authority to be located on a permanent basis at the Vikki Campus in Helsinki. (Note: The European Food Safety Authority is currently located on a temporary basis in Brussels pending a decision of the European Council of Ministers on its future permanent location. Currently, no date has been set to discuss this decision).

Helsinki University of Technology

The Helsinki University of Technology is situated next to the University of Helsinki. It comprises 12 Departments, offering seventeen degree programmes. The University of Technology campus adjoins that of the University of Helsinki. As physical neighbours both universities collaborate closely on areas of mutual interest.

(x) Summary

Similarly to Denmark, Finland provides a well-funded VET programme that provides structured entry points for students at upper-secondary and tertiary level interested in pursuing a career in the food industry. Students wanting to enter the trades receive formal instruction over three years with a mandatory work placement lasting six months. The university programmes and the polytechnics tend to offer food-related courses with a heavy emphasis on scientific research. This approach provides graduates with the capability to undertake highly complex research in the areas of biotechnology, food chemistry and functional foods.

Joint Secretariat

Forfás, Wilton Park House, Wilton Place, Dublin 2.

Tel: 01-607 3000 Fax: 01-607 3030

E-Mail: info@forfas.ie Website: www.forfas.ie

FÁS, 27-33 Upper Baggot Street, Dublin 4.

Tel: 607 0500 Fax: 607 0600

E-Mail: info@fas.ie Website: www.fas.ie

The Demand and Supply of Skills in the Food Processing Sector

