A Development strategy for the Irish Pig Industry 2008 to 2015

Prepared by the Teagasc Pig Production Development Unit following consultation with stakeholders

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1. Summary and recommendations

1.1. Formulation of the Development Strategy

Background

The Irish pig industry in 2007 finds itself threatened by a crisis of confidence arising from a combination of new legislation (environment and welfare), low return on investment, very high feed prices and low profitability and a shortage of skilled labour. It is an opportune time for stakeholders to combine to critically examine the industry.

Objective

The object of the exercise was to formulate a development plan for the industry for the next decade, an industry that would:

(1) produce pigmeat to the highest standards of quality and safety,
(2) would be internationally competitive, while having due regard for the health and welfare of both staff and animals,
(3) minimize its impact on the environment and
(4) adequately remunerate pig producers.

The process

A discussion document containing a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the Irish pig industry was prepared by staff of the Teagasc Pig Production Development Unit and distributed to stakeholders (approximately 600) as a special issue Teagasc Pigs Newsletter. Written submissions were received from organisations and individuals, meetings were held with industry representatives and focus groups of producers. A Development Strategy document was compiled from published literature and the submissions received. Draft recommendations were presented to a meeting of stakeholders and feedback requested. The complete Development Strategy report will be available on request.

1.2. Background – The Irish pig industry in brief

- Third most important sector in agricultural out put after beef and milk
- About 7,500 jobs including production, slaughter, pork processing, feed manufacture, services
- Pig population in Ireland is about 1.7 million
- Sow herd c. 150,000
- Commercial units 440 (290 integrated; 50 breeding only; 100 finishing only)
- Average size of commercial sow units 420 sows
- Slaughter weight c. 76kg carcass or c. 100kg liveweight
- Exports about 60% of production, worth €250 million in 2006
- Imports about 25% of home market (a high proportion of backs or loins)
- Consumption – pork is the most consumed meat in the world - 38%, in Europe (EU-25) - 49% and in Ireland - 41%
- Consumption worldwide is increasing steadily

- Feed usage by the pig industry is about 925,000 tonnes about 600,000 tonnes compound and 325,000 tonnes home mixed
- Main ingredients are barley, wheat, soyabean meal. Minor ingredients maize, sorghum, sugar beet pulp, molasses, cereal by products, milk products in feeds for young pigs,
- Diets are fortified with a range of vitamins and minerals. Crystalline amino acids are widely used.
- Main strengths of the industry – specialised units, high productivity, health status
- Main weaknesses of the industry – feed price, transport costs
- Main opportunities – demand for pigmeat
- Main threats – environmental regulations, skilled labour shortage, herd health

1.3. Drivers of change in the pig industry

The major influences which will shape the form and scale of the Irish pig industry over the next decade are:

1. International competitiveness
2. Market returns, profitability and return on investment
3. Food safety
4. Environmental legislation
5. Animal welfare legislation
6. Rapid adoption of new technology
7. Entry of highly skilled personnel and their retention in the industry

1.4. A vision of the Irish pig industry in 2015

- National pig herd - 1.8 million pigs including 150,000 sows
- Annual slaughterings 3.6 million pigs
- Number of production units about 500 (increase due to contract finishing)
- Sow productivity 24 pigs per sow
- Average weight of carcass at slaughter 80kg (= 105kg liveweight)
- Superior health status in the national herd
- All production to Bord Bia Quality Assurance standard
- Manure nutrient reductions through diet formulation
- Every production unit achieving a high level of physical performance and availing of a high quality benchmarking system for physical and financial performance
- Less reliance by producers on trade credit
- Comprehensive training programme for improving skill levels of managers and stock persons
- A better, more positive public image of the sector
- Closer liaison between the industry sectors – feed manufacture, pig production and meat processing

2. Recommendations for development of the industry

A. ALL STAKEHOLDERS

Despite ranking third after milk and beef in terms of Gross Agricultural Output the pig sector attracts minimal state support. It is perceived as having a significant negative impact on the air and water quality and a sector that does not warrant significant investment by state agencies. This perception grossly misrepresents a technically efficient industry that has developed in response to the demands of the market.

1. Given the uncertainty in the sector concerning its medium to long term future viability stakeholders should obtain reassurance that it is national policy to maintain a viable pig industry in this country.

2. All stakeholders should fund and participate in a combined effort to promote the significant contribution of pig production to the agricultural economy, employment in rural areas and to counter the negative public perception of the industry among legislators, regulators and the general public.

B. ENVIRONMENTAL REGULATORS (EPA, DOEHLG and DAFF)

The restrictions imposed on the spreading of pig manure as a fertilizer under the Good Agricultural Practice (Protection of Waters) legislation and the conditions attached to Integrated Pollution Prevention and Control (IPPC) licensing (formerly Integrated Pollution Control or IPC) are in real danger of causing a serious reduction in the size of the industry. The scientific basis for some of the regulations is not clear.

1. Pig producers should be allowed to operate and develop under regulations and conditions that adequately protect the environment while ensuring the financial viability of their units.

2. Once the owner of a pig unit that is required to have an Integrated Pollution, Prevention and Control license can demonstrate and assure the EPA that all the pig manure is being managed in compliance with Statutory Instrument 378 of 2006 there should be no requirement to provide further information in relation to farmer customer lands to the Environmental Protection Agency.

3. The Department of Environment, Heritage and Local Government and the Environmental Protection Agency should clarify how pig manure put through a treatment process will be classified with specific reference to whether or not it is considered a waste under the Waste Management Act.

4. The conditions for the grant of planning permission that may be applied to development on pig units should be transparent and consistent across all local authority areas.

5. Ireland should initiate a proposal to the EU to allow N from pig manure or the N rich separated liquid fraction of manure be used to replace chemical N on grassland without contravening the Nitrates Directive Organic N limits. This will result in fossil fuel savings and reduced greenhouse gas emissions without a negative effect on water quality.

6. There should be a reassessment of whether soil test P is an appropriate indicator of vulnerability of water bodies to P entry from soil and an alternative measure based on the Iowa P Index which combines soil test P, topography, cropping etc. should be considered.

C. PIG PRODUCERS

There is little evidence of significant improvements in technical efficiency in Irish pig herd in the last decade and efficiency levels have fallen substantially behind other countries especially in relation to litter size and pig growth rates. This is at least partly attributable to the loss of staff to other more remunerative sectors outside of farming and increased reliance on untrained non-national workers. Feed costs per kg carcass are higher in Ireland than in other countries and this is partly related to the purchasing and feeding practices adopted by pig producers in Ireland.

1. Producers must reassess their breeding programmes, gilt management and sow feeding strategies to maximize the number of pigs born alive per litter to achieve a minimum of 12 born alive per litter.

2. Pig producers should make wider use of the Teagasc PigSys programme to assess and benchmark their herd performance and production costs against the top quartile of producers (see also recommendation no. I 3).

3. Feed credit is an expensive source of financing. Pig producers should reduce and ideally eliminate their dependence on feed credit to part-finance the operation of the unit.

4. Pig producers should negotiate lower feed prices by offering payment by direct debit.

5. Pig producers should provide good facilities e.g. housing, canteen and showers for employees.

6. Pig producers should ensure that their employees have working conditions, including pensions, health insurance, life assurance and working hours, comparable to those available in other industries.

7. The owners of pig units should ensure that their units are fully compliant with Health and Safety legislation.

8. Pig producers should put in place and maintain effective biosecurity procedures on every unit.

9. Pig producers and their customer farmers should be proactive in minimizing the impact of odour from their activities on neighbours.

10. Contract finishing of pigs (using an all-in all-out management system) should be explored as a means of reducing stock numbers on larger units, improving health status, increasing slaughter weight and spreading the manure load.

11. The IFA should consider promoting educational tours by producers to improve relationships (between producers) and assess technology abroad in production processing and marketing. Travel scholarships or grants should be used to encourage participation by young workers and managers in these trips. Commercial sponsorship may be available.

12. A national programme of herd health monitoring should be established based on regular examination of pigs at slaughter.

D. PIG SLAUGHTERERS

Discussions between pig slaughterers and their pig suppliers all too rarely move beyond the single issue of pig price. There is a marked absence of clear guidelines on ideal weight bands, ideal lean meat content or other specific requirements. Average slaughter weights have increased very significantly without recourse to castration to prevent boar taint. The requirements of secondary processors will be increasingly supplied from abroad if they cannot obtain the product of the specification and quality they require from Irish slaughterers.

1. All slaughtering plants should engage with pig suppliers to detail and explain their requirements in relation to the type of pig required and including carcass weight range, lean content, conformation and meat quality attributes.

2. The present payment schedule should be reassessed to take account of market requirements, changes in slaughter weight and changes in the lean content of carcasses.

3. Longer term supply contracts should be considered with a view to lowering of slaughtering costs through better factory capacity utilisation.

4. Procedures should be put in place by slaughterers and their suppliers to ensure that problems with boar taint do not occur in view of the increase in pig slaughter weights.

5. Improving eating quality of pigmeat through use of the best pre- and post-slaughter technologies should be a priority for slaughter plants.

6. Pig slaughterers should provide suppliers with quarterly summary of pigs supplied detailing kill-out, weight distribution, lean content and condemnations showing how this compares with the average. The PIGIS package used in Northern Ireland would appear ideal for this purpose.

E. INDUSTRY REPESENTATION

With the introduction of a comprehensive range of new regulations and inspections for pig producers the need for a strong representative organization has never been greater. A strong, well-supported and effective organization to represent producers' interest in dealing with Government departments and state agencies as well as representatives of the other sectors in the industry is essential. The Pigs and Pigmeat Committee of the Irish Farmers Association has been and is likely to be the only body capable of representing producers' interests. The limited membership of the Irish Association of Pigmeat Processors means that a significant proportion of the slaughter sector are not represented at national level. The secondary processing sector does not appear to liaise with pig producers.

1. The present regional structure and representation on the Pigs and Pigmeat Committee of the Irish Farmers Association should be reviewed to have fewer but more active regional committees.

2. All producers must provide strong committed financial and active support to IFA to ensure that it can adequately research issues and represent the interests of pig producers.

3. The IFA Pigs and Pigmeat committee should provide increased communication with its membership through more regular newsletters and emails.

4. Meetings of IFA Pigs and Pigmeat Regional Committees should include a technical presentation in addition to the normal agenda with a view to stimulating attendance.

5. Pig slaughter plants and pigmeat processors should participate in a forum established to represent their interests and to provide effective liaison with stakeholders (including producers) on a regular basis.

F. DEPARTMENT OF AGRICULTURE AND FOOD

The Department of Agriculture and Food is centrally involved in the pig sector through a wide range of regulatory and support functions. These include herd registration, movement monitoring, food safety, pig health and welfare, feedstuffs and feed manufacture, controls on the use of medication and monitoring for inhibitory substances, disease eradication programmes, veterinary laboratory service, carcass grading and, grant aid for farm improvements including manure storage and pig welfare.

1. The Department of Agriculture and Food should provide funding for the auditing of pig farms under the new Bord Bia Pigmeat Quality Assurance Scheme as is already being done for Beef Quality Assurance.

2. The Department of Agriculture and Food should designate one veterinary laboratory to carry out investigations on pig disease and provide appropriate specialist staffing for this work.

3. A concerted effort to eradicate Aujeszky's Disease from the remaining few positive herds must be made immediately by the Department of Agriculture and Food.

4. The operation of the Salmonella Control Programme should be reviewed and a co-ordinator appointed by the Department of Agriculture and Food to oversee its operation.

5. A clear policy decision is urgently required from Department of Agriculture and Food in relation to Porcine Reproductive and Respiratory Syndrome (PRRS).

6. The Department of Agriculture and Food should actively and financially support the establishment of a national Pig Health Monitoring Scheme (see C 12 above).

7. The system of carcass grading and payment on carcass lean content should be applied to all licensed export premises slaughtering over 200 pigs per week and be regularly checked by the Department of Agriculture and Food as required by legislation and with appropriate funding as per the Beef Classification Scheme.

8. The use of the newer carcass classification methods, e.g. Autofom, for measuring carcass lean meat content should be assessed and, if suitable, approved.

9. The formula used for calculation of lean meat content should be updated at intervals of 5 to 8 years.

10. The process at EU level for authorisation of GM feed ingredients (after completion of safety assessment by EFSA) should be speeded up to avoid the problems with importations such as have occurred during 2007.

G. FEED

Feed represents the single largest item of cost in producing pigs at, at least, 65%. Feed costs in Ireland are higher than in any of the main EU pigmeat producing countries. This reflects the higher cost of feed ingredients to feed manufacturers but high feed manufacturing and delivery costs here also contribute to the significant disadvantage that arises.

1. Pig producers should reassess their feeding programmes with a view to using less of the expensive diets i.e. creep, link and weaner feeds.

2. The cost-benefit of using high nutrient specification diets should be independently evaluated for weaners, finishers and lactating sows.

3. Pig producers should demand independent evaluation of the cost-benefit before including expensive ingredients and additives in diets.

4. Pig feed prices in Ireland are uncompetitive. Feed compounders must target a reduction in the pig feed price differential between Ireland and other EU member states.

5. Feed industry costs in Ireland should be benchmarked internally and against best practice internationally.

6. Manufacturers should declare the inclusion levels of ALL ingredients (or nutrients) included in premixes.

H. RESEARCH

In the absence of an effective research and development programme the pig and pigmeat industry will at best stagnate and is more likely to regress. By comparison with the pig sectors in very many other countries the Irish investment in research and development, on a per pig basis is paltry. Pigmeat amounts to about 40% of per capita meat consumption in Ireland, with poultry about 30% and beef 20%. It is perceived that the eating quality of Irish pigmeat compares unfavourably with that in other countries.

1. Producer and slaughterer investment in pig research and development is unsatisfactory and should be increased to 25c per pig which is still less than that in most other countries.

2. Arising from recommendation H 1 above, the Teagasc research portfolio of near-market (more applied) pig production research should be greatly expanded and include more on-farm studies.

3. An on-going programme of research should be conducted on the quality of Irish pigmeat with specific reference to the perception of dryness/lack of juiciness, salt levels, boar taint, and overall eating quality.

4. The Ashtown Food Research Centre should play an increased role in pigmeat research and development. There is a need for the centre to have an active on-going programme on pigmeat quality and be the resource base of first call for the pigmeat processing industry.

5. A research study should be carried out to establish how the genetic material available to pig producers compares with that in other countries in relation to such key parameters as Litter Size and Growth Rate.

6. Factors affecting P loss from soil to water should be investigated and the suitability of an indexing system for Ireland based on the Iowa P index should be investigated (see recommendation no. B 6 above).

I. TECHNOLOGY TRANSFER

The levels of technical efficiency reported for recorded herds in countries such as Denmark, France and the Netherlands show significant improvement over the last decade in contrast to Ireland where performance has been static. Reduced expenditure in research and technology transfer is a contributory factor to this loss of competitiveness. The methods used for technology transfer have to be adjusted to take account of the changing structure of the industry, reduced resources, changes in the labour force on units and herd health considerations.

1. Teagasc should establish and staff a training programme for operatives and managers with appropriate certification which would be part-funded from the increased R&D contribution (recommendation H 1).

2. The Teagasc Pig Development unit should continue to evaluate and expand the methods used for technology transfer in the light of changes in herd structure. This would include more frequent electronic communications.

3. Teagasc should offer a record analysis and performance benchmarking service (PigSys) independent of advisory contracts.

4. Teagasc Pig Development Unit should continue to liaise with their Northern Ireland counterparts in service delivery.

J. BORD BIA

Pigmeat exports represent a substantial proportion of total pigmeat production and especially when allowance is made for the 0.45-0.5 million pigs exported live, mainly to Northern Ireland. Bord Bia has responsibility for marketing of Irish pigmeat abroad as well as for the promotion of pigmeat on the home market. Bord Bia is responsible for the development and operation of Pigmeat Quality Assurance Scheme. The work of Bord Bia is not always evident to producers who contribute 25c per pig by way of levy to its operations. This contribution is low by international standards.

1. An Bord Bia should provide an annual report to pig producers of its activities and expenditure on pigmeat promotion and marketing.

2. The Bord Bia Quality Assurance Scheme should be established as the norm for the industry with full participation by producers and slaughterers.

K. PIG HEALTH PROTECTION

As an island there is a reasonable expectation that all of Ireland would be free of many serious and debilitating diseases of pigs. Despite stringent efforts on the part of the industry and breeding companies in particular new health problems continue to arise with very serious impact on production and profitability. In recent years both Porcine Reproductive and Respiratory Syndrome (PRRS) and Post-Weaning Multi-systemic Wasting Syndrome (PMWS) have become serious problems.

1. Close co-operation should be established with Northern Ireland authorities in ensuring that the AD eradication programmes in both jurisdictions is successful with a view to establishing a common and superior health status for the island.

2. The current role of the National Pig Health Council should be reviewed and consideration should be given to having a similar body operate on an all-island basis with annual reporting of its activities.

3. Implementation of development plan

It is proposed that a body representative of the stakeholders in the industry (IFA, NCPP, IAPP, IGFA, DAFF, Bord Bia, Teagasc) under an authoritative, independent chairperson should be set up to meet twice yearly, to monitor progress on this development plan and make its findings public within 4 weeks of its meetings. This would be similar to the Sheep Industry Implementation Group set up in 2006 (DAFF, 2006) and the recently announced Beef Forum (DAFF, 2007). Subject to agreement from Northern Ireland this body might invite participation from the NI pig industry.

4. Introduction

The Irish pig industry, at the present time, is at a crossroads. It is buffeted by regulations such as the Nitrates Action Plan (SI 378 of 2006; EC Good Agricultural Practice for Protection of Water Regulations of 2006), welfare legislation and perceived hostility from regulators. Most producers are reluctant to invest in an industry that has an uncertain future and where the return on investment is perceived to be less than is available elsewhere. There is a need for an action plan or development plan, which would have a considered input from the several stakeholders in the sector. This plan would provide a focus for the future direction of production.

The plan would include realistic targets to be achieved within a specified time based on a business planning approach.

Earlier Development Plans for the pig industry included Teagasc (1997), IFA (1999) and Prospectus Report (2000). Recent development plans for pig industries worldwide include the UK (BPEX, 2006c), Australia (APL, 2005) and Canada (Canadian Pork Council, 2007; Grier and Mussell, 2007).

4.1. Objective of study

The objective of this exercise is to prompt an in-depth analysis of the industry by individuals and by representative bodies of stakeholders and to identify strategies that would improve the competitive position of the industry internationally.

4.2. Methodology

Stakeholders were notified by a special issue Teagasc Pigs newsletter in May 2006 and interested parties were invited to make written submissions. The newsletter included a draft SWOT analysis of the pig industry. Some bodies and individuals made phone contact with the authors. The views of the contributors were then distilled into a strategy document by the members of the Teagasc Pig Production Development Unit staff whose names are listed in Appendix 1. The draft recommendations were presented to representatives of stakeholder organisations and feedback was requested.

4.3. Drivers of change in the pig industry

The major influences which will shape the form and scale of the Irish pig industry over the next decade are the following:

1. International competitiveness
2. Market returns, profitability and return on investment
3. Food safety
4. Environmental legislation
5. Animal welfare legislation

6. Rapid adoption of new technology
7. Entry of highly skilled personnel and their retention in the industry

5. Background

5.1. The Irish pig industry

Pig production is an important sector of the agricultural economy of Ireland ranking third in Gross Agricultural Output (GAO) after milk (30%) and beef (25% - Table 5.1) . Pigmeat amounts to about 6% of GAO while sheep account for about 4%. The value of pigmeat exports in 2006 was €250m per annum and live pig exports were worth an additional €50 million.

Table 5.1. Value of Gross Agricultural Output from principal commodities 2001 to 2006

Year	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Total	5099	4709	4849	5031	4964	5109
Milk	1566	1413	1432	1418	1337	1323
Cattle	1260	1179	1244	1346	1413	1479
Sheep	284	202	193	200	192	190
Pigs	**346**	**301**	**285**	**297**	**292**	**312**
Pigs % of total	6.8	6.5	5.9	5.9	5.9	6.1

Source: CSO

5.2. The national herd

There are about 155,000 breeding sows in Ireland and about 1.7 million pigs in all. Trends in herd size and output are shown in Table 5.2.

Table 5.2. Pig population (December census) and pig output in Ireland 2000 to 2006

Year	*No. Sows December (000)*	*Total No. pigs (000)*	*Slaughterings Licenced Export (000)*	*Slaughterings Other (000)*	*Live Exports (000)*	*Total Pig Disposals (000)*
2000	167	1,732	3,048	99	237	3,384
2001	169	1,763	3,196	62	63	3,322
2002	165	1,781	3,038	68	368	3,473
2003	158	1,732	2,834	62	469	3,366
2004	158	1,758	2,684	60	426	3,170
2005	156	1,678	2,618	25	520	3,163
2006	149	1,620	2,619	25	475	3,124

Source: CSO and Bord Bia

See Appendix 2 for statistics 1980 to 2000.

5.3. Ownership and operation of pig units in Ireland

Worldwide ownership of pig production units falls into three principal models:

- Vertical integration
- Co-operative ownership
- Independent producer

Vertical integration which has driven the US pig industry in the past decade has not occurred in Ireland. In this model, the pig farmer is a contractor to the meat packer who owns the pigs and supplies the feed and the farmer supplies the housing and labour. It is similar to that operated by the poultry industry in Ireland.

"In the US, four corporations account for 65% of the slaughter capacity, 30 corporations represent 50% of production and a handful of processors own and control 25% of production, The result, large quantities of pork of similar quality and based on a definitive genetic and production system" according to Buoma (2006).

The majority of pig production units in Ireland are independently operated and are family owned. There are a small number of units operated by (1) feed companies or meat companies, and (2) co-operatives which evolved from co-operative pig finishing units which operated a central finishing farm purchasing pigs from shareholder suppliers, most of whom had very small units. These finishing units had difficulty in avoiding respiratory and enteric diseases due to co-mingling of the incoming pigs from several units.

Traditionally the Irish pig industry developed alongside the dairy industry and through the period from 1960 to 1980 large pig units became operational in areas where there was a supply of milk by-products - whey (from cheese and casein production) and skim milk e.g. Mitchelstown Co. Cork, South Tipperary, Cavan.

Nowadays, many pig units tend to be specialised (i.e. sole or principal enterprise on the farm) though there are a significant number of pig units operating on farms with another enterprise (usually grassland based). These farms face particular difficulty in complying with SI 378 of 2006.

On account of unit size (see section 5. 6 below) there is a high proportion of paid labour (including unit management) on Irish pig units. The restructuring of the pig industry in Ireland in the 1970s means that a high proportion of owners and operators are now in the older age category and will be more cautious, less innovative and more likely to exit the industry in response to low profitability or legislative change.

5.4. Pig output

Pig slaughterings increased from c. 2.0 millions in 1985 to c. 3.0 millions in 1993 and numbers have been relatively stable since then (Table 5.2 and 5.3). Because of movement of pigs for slaughter into and out of Northern Ireland it is important to examine the pattern of slaughterings in the entire island rather than the Republic alone.

Table 5.3. Pig Slaughterings on island of Ireland (000 head)

Year	Republic of Ireland	Northern Ireland	Total
2001	3,259	1,067	4,326
2002	3,104	1,228	4,332
2003	2,867	1,324	4,190
2004	2,707	1,311	4,018
2005	2,618	1,195	3,813
2006	2,619	1,297	3,916

Source Bord Bia Market Monitor

5.5. Geographical distribution

Table 5.4 shows the distribution of pigs by county, the utilised agricultural area (UAA) and the density of pigs in each. The three largest pig-producing counties are Cavan (40,000 sows), Cork (38,000 sows) and Tipperary (14,000 sows) representing 52% of the national sow herd. The next two largest counties are Waterford (9,000) and Longford (7,700).

The contribution of pigs (and poultry) to the Organic N loading in Ireland is low even within counties perceived to have a high density of pigs (Table 5.4).

County Cavan at 3.5ha/sow has the highest density of production in Ireland whereas Co. Longford with the next highest has 9.6 ha per sow. Production in Cavan is in the east and south of the county adjacent to Co. Meath where the density is low at 47ha per sow.

Tillage land in Ireland amounts to only 9% of utilised agricultural area and by county this varies from over 30% in Dublin, Louth and Wexford to around 1% in the Western counties and Longford. Among the counties with a high density of pigs Cavan has 2% tillage and Cork has 13% (Table 5.5; Appendix Table 4).

The overall density of pig production, expressed as the agricultural area used (AAU) per sow, in Ireland (25.7ha/sow) is low when compared to the Netherlands (1.9ha), Denmark (2.0ha) and Belgium (2.2ha). Within these countries entire provinces/regions have under 1.0ha per sow e.g. N. Brabant and Limburg in Netherlands and Flanders in Belgium while Brittany (<3ha) and Catalonia (<2.0ha) also have intensive pig industries (Table 5.6).

Table 5.4. Sow and pig numbers by county2005

COUNTY	NUMBER	TOTAL SOWS	FINISHERS
Clare	5	1,320	6,000
Galway	5	495	2,870
Mayo	14	2,650	13,270
Roscommon	5	1,830	9,300
Sligo	2	885	4,500
Leitrim	7	2,445	12,550
Longford	13	7,690	35,000
Donegal	20	3,450	18,300
Carlow	8	1,304	12,070
Kilkenny	21	5,760	30,900
Wicklow	6	1,440	17,790
Laois	11	4,720	24,620
Wexford	25	4,937	23,865
Louth	2	1,200	4,600
Meath	14	4,558	22,550
Dublin	1	0	500
Kildare	15	3,775	13,350
Offaly	17	5,555	17,500
Westmeath	15	6,215	37,950
Cavan	67	27,450	154,475
Monaghan	18	3,350	18,850
Cork	86	29,245	150,968
Kerry	18	4,345	23,320
Tipperary	36	17,093	78,370
Waterford	19	7,815	49,746
Limerick	12	4,755	25,500
TOTAL	462	154,282	808,714

Table 5.5. Density of pigs in Ireland by county (year = 2000) and contribution of pigs and poultry to Organic Nitrogen loading.

	Area Farmed	All Pigs	Breeding Pigs	Pig/100 ha	Sows / 100ha	Sows / 100ha tillage	ON load, kg/ha	Pigs as % ON	Pigs + Poultry as % ON
	000 ha								
Ireland	4443	1722	176.85	38.8	4.0	44.1	106	3.1	4.1
Leinster	1346	484	48.2	36.0	3.6	19.0	108	2.7	3.0
Longford	73.8	72.0	7.7	98.0	10.4	854.4	107	7.9	8.0
Munster	1657	715.8	73.9	43.2	4.5	63.1	117	3.1	4.0
Cork	533.8	364.1	38.5	68.2	7.2	57.6	128	4.7	5.2
Limerick	202	55.5	6.0	27.5	2.9	212.5	128	1.9	4.9
Waterford	124.4	88.5	8.6	71.1	6.9	56.3	135	4.2	6.5
Connaught	971	68.2	7.3	7.0	0.8	48.1	85	0.7	1.0
Ulster	469	454	47.4	96.8	10.1	334.1	106	7.9	12.9
Cavan	138.3	374.6	39.5	270.9	28.6	1881.9	133	17.8	19.3
Monaghan	99.6	40.1	4.0	40.3	4.0	222.8	153	2.2	16.4
Max	533.8	374.6	39.5	270.9	28.6	1881.9	153	17.8	19.3
Min	37.7	0	0.01	0.0	0.0	0.1	58	0.0	0.3

Only counties where pig and poultry contribute more than 4% to the Organic Nitrogen load are shown. For full list see Appendix Table 3.

Table 5.6. Density of pig production in regions within EU countries

	Country	*Million pigs*	*UAA (1000ha)*	*Pigs/km^2 UAA*
Netherlands south west	NE	10.2	815	1,257
Flanders	BEL	5.9	618	949
Catalonia	SP	6.6	1,182	559
Denmark Jutland	DK	10.3	1,892	543
Brittany	FR	8.4	1,791	469
Nord Rhine-Westphalia	GER	6.2	1,522	406
Lombardy	IT	4.2	1,120	371
Murcia	SP	2.2	629	342
Lower Saxony	GER	8.0	2,626	306
Grand Poland	POL	5.1	1,763	287
Kujawsko-Pomorskie	POL	2.2	1,036	210
Aragon	SP	4.7	2,417	195
Baden-Wurtemburg	GER	2.3	1,444	158
Emilia-Romagna	IT	1.6	1,234	132
Bavaria	GER	3.7	3,293	113
Mazovie	POL	2.1	2,046	101
Estremadura	SP	1.8	2,233	79
Castille-Leon	SP	3.7	5,127	73
Pays de Loire	FR	1.7	2,311	72
East Hungary	HUN	2.1	3,336	64
Andalusia	SP	2.3	4,813	48
Castille –La Mancha	SP	1.6	4,718	35
Ireland	***IRE***	***1.7***	***4,443***	***39***
Cavan	***IRE***	***0.37***	***138***	***271***

100ha = 1km^2. Source: IFIP 2007. Data are for 2006 except Poland and Hungary 2005. Only regions with more than 1.6 million pigs are included

5.6. Distribution by unit size

There are now few pigs (<2%) in units of under 100 sows and in general units of under 300 sows are tending to account for a smaller share of the national herd. Table 5.7 shows the results of a recent Teagasc survey

Pig units in Ireland tend to be large by European standards (Table 5.8) but average herd sizes in the other European countries are rapidly moving towards the Irish model. In Denmark average herd size has gone from 345 (total pigs equal to about 35 sows) in 1991 to near 2,000 today and is forecast to reach 4,000 in 2015. In that period the number of pig iunits in Denmark will have gone from about 28,000 to 3,500 (Roguet, 2007).

While a majority of **sows** in Ireland (c. 72%) are in units which are above the licensing threshold, the majority of **units** (c. 64%) are under this threshold. Most of these smaller units are on mixed farms with another animal enterprise, often dairy cows.

Table 5.7. Distribution of breeding sows by herd size

Sow Herd Size	*Sows (No. units)*			
	Integrated	*Breed*	*Total*	*% of sows*
<100	2,264 (35)	505 (9)	2,769	2
100-199	6,963 (50)	1,110 (8)	8,073	5
200-299	15,483 (64)	1,915 (8)	17,398	11
300-499	17,905 (48)	3,635 (9)	21,540	14
500-999	38,229 (58)	8,656 (13)	46,885	31
1000-1999	29,795 (24)	6,870 (4)	36,665	24
>2000	19,610 (9)	0	19,610	13
Total	*130,249*	*22,691*	*152,940*	*100*

Source: Teagasc survey 2007.

Table 5.8. Distribution of pig herds by size (Ireland and selected EU countries)

	<20 sows	20 to 99	>99	Average sow herd, no.
Germany	4	28	68	66
Spain	5	16	78	69
Poland	70	16	14	4
Denmark	1	4	95	234
Netherlands	0	4	96	225
France	1	17	82	111
Belgium	1	29	79	107
UK	3	8	88	82
Italy	7	9	83	43
Ireland	0	2	98	424
EU-25	13	17	71	21

Source: IFIP 2006. Data are for 2003. Data for Ireland from Teagasc are for 2005

5.7. Employment in the pig industry

The direct employment at farm level amounts to at least 1,200 persons (based on a national sow herd of 155,000 and one person employed full-time for 130 sows). At present at least 26% of employees on pig units are non-Irish, mainly East European. There are large numbers employed in the other various sectors within the overall pig industry. These include haulage, slaughtering, meat processing, feed manufacture and transport, building services, veterinary

services and supplies, manure transport and spreading, financial services and office staff, etc. The total employment attributable to the pig sector is estimated at about 7,500. This is consistent with estimates of jobs per million pigs produced in the US (Salazar and McNamara, 2005) and Canada (MAFRI, 2002).

Attracting talented young people into the pig industry was identified by Ellis (2006) as an important factor in determining its future competitiveness. Kliebenstein et al (2006) found that fewer young people were entering pig production in the US and the average age of US pig producers rose by 4.1 years in the five year period from 2000 to 2005. From 1990 to 2005 (15 year period) the average age of producers rose by 8.1 years and that of employees rose by 9.1 years.

5.8. Public perception of the pig industry

The Irish pig industry suffers from a negative image, with the sector being associated with deteriorating water quality, offensive odours, residues in meat and poor welfare for animals. There is scant objective evidence for many of these claims but the industry has been remiss in not being pro-active in portraying the positive aspects of the industry, its contribution to employment in rural development and as an economical source of high quality meat for consumers.

6. The global pig industry

The world pig population is, at present, about 820 millions and the number has increased steadily over the last 50 years from about 300 million in c. 1950 (Pond, 1991). While the majority of pig numbers are in Asia (Table 6.1; Table 6.2), commercial pig production is carried out mostly in Europe and North America.

World wide, production of pigmeat exceeds that of any meat and demand is expected to continue to rise over the next 20 years (Table 6.3; Elam, 2004).

Supplying the meat requirements of more affluent world population is seen as a major challenge in terms of feed supply and environmental protection (FAO, 2006a; Steinfeld et al., 2006).

While consumption of both beef and sheepmeat has been stagnant between 1991 and 2001 pigmeat consumption has increased by 28% and 65% respectively. This rate of expansion in consumption of the two "white meats" is projected to continue to 2025 (Elam, 2004), by 62% in pigmeat and by 73% in the case of poultry. This demand can only be satisfied with minimal environmental impact by efficient, intensive production systems.

Table 6.1. Pig population in major regions of the world

	2001	2002	2003	2004	2005 (p)	2006 (f)
Beginning Inventories						
China; Peoples Republic of	446.8	457.4	462.9	466.0	481.9	500.3
European Union 1/	152.8	152.5	154.3	152.8	151.1	153.1
Brazil	32.4	32.7	32.7	32.1	32.3	32.9
Russian Federation	15.8	16.6	17.0	17.2	16.5	16.7
Canada	13.6	14.4	14.7	14.6	14.7	14.5
Philippines	11.7	11.8	12.2	12.5	12.1	12.1
Mexico	10.6	10.6	10.5	10.7	10.3	10.0
Japan	9.8	9.6	9.7	9.7	9.6	9.5
Korea, South	7.4	7.9	8.1	8.4	8.0	8.1
Taiwan	7.5	7.2	6.8	6.8	6.8	7.2
Others	17.9	18.8	20.6	18.3	17.1	17.3
Total Foreign	**726.3**	**739.4**	**749.6**	**749.1**	**760.5**	**781.8**
United States	**59.1**	**59.7**	**59.6**	**60.4**	**61.0**	**61.2**
Total	**785.5**	**799.1**	**809.1**	**809.5**	**821.5**	**843.0**

Source: Livestock and Poultry: World markets and trade March 2006. Foreign Agricultural Service USDA http://www.fas.usda.gov/dlp/circular/2006/06-03LP/swine_sum.pdf (Nov 1, 2006)

http://www.fas.usda.gov/dlp/circular/2006/2006%20Annual/Livestock&Poultry.pdf

Table 6.2. Annual pig slaughterings in major regions of the world (2001 to 2006)

Production (Pig Crop)						
China, Peoples Republic of	563.0	575.2	597.8	636.7	675.0	700.0
European Union 1/	255.1	260.0	254.2	249.2	251.0	252.7
Russian Federation	32.2	34.2	35.0	35.0	36.0	38.2
Canada	28.2	29.6	31.4	33.1	32.6	32.4
Brazil	29.2	30.1	29.7	30.0	32.3	31.3
Philippines	21.0	21.5	23.1	22.8	22.1	22.5
Japan	17.1	17.0	17.3	17.2	17.0	17.1
Mexico	15.1	15.3	15.3	15.4	15.5	15.7
Korea, South	15.0	15.9	15.9	14.8	13.8	14.1
Taiwan	11.3	10.5	10.3	11.9	12.0	12.2
Others	25.0	27.0	24.0	22.5	22.8	23.5
Total Foreign	**1,012.1**	**1,036.4**	**1,054.0**	**1,088.6**	**1,130.2**	**1,159.6**
United States	**100.6**	**101.7**	**101.5**	**102.8**	**103.7**	**105.0**
Total	**1,112.7**	**1,138.0**	**1,155.5**	**1,191.4**	**1,233.8**	**1,264.6**

6.1. North America

Pig slaughterings in the US in 2005 amounted to 105 million head. About 12% of production is exported. Traditionally pig production in North America was concentrated in the grain growing states of the US Midwest especially Iowa, Indiana and Illinois. The 1980s saw a shift in production to states such as North Carolina where large production units became common often owned by corporate entities. Later, states in the south west such as Oklahoma saw rapid

increases. Low population density, an arid climate and less opposition to development of units were important factors.

Table 6.3. World meat consumption and projected demand (million tonnes)

	1961	*1971*	*1981*	*1991*	*2001*	*2025*
Beef, veal	28	38	48	54	56	73
Pork	25	39	53	71	91	147
Poultry	9	16	28	43	71	123
Sheep	5	6	6	7	8	8
Misc	5	6	7	9	11	15
Total	71	105	139	184	237	366

Source: Elam (2004)

However, the drivers of location of livestock enterprises are not well understood (Carpentier et al, 2004). Informa Economics (2005) concluded that the behaviour of key firms and state legislation (family farm legislation, environmental regulations) were more important than natural resources in determining whether a regional pig industry expands or contracts. As examples Georgia and North Carolina with similar climates, cultures and natural resources both had about 2 million pigs in 1984. In 2004 North Carolina had about 10 million and Georgia had about 0.3 million. In the same period Indiana in the "cornbelt" went from 4.5 million to 3.0 million and Oklahoma went from c. 0.2 million to c. 2.5 million (Informa Economics, 2005).

The most pronounced change in US production over the past 25 years has been in sow productivity. The size of the US breeding herd (sows, gilts, boars) declined from about 10 million to about 6 million while pigmeat production per sow per year has almost doubled going from 725kg to 1360kg (Informa Economics, 2005; NASS 2006).

The scale of slaughtering plants is another notable feature of the US industry with twelve plants each slaughtering over 4 million pigs per year (15,000 per day) and one slaughtering 8 million per year or 30,000 per day (Informa Economics, 2005). World wide, only one Danish plant compares in capacity to the US plants.

Japan is the destination of about 35% of US pigmeat exports with Mexico taking another 15 to 20% (Marche du Porc Breton, 2007).

In Canada, pig production is predominantly in Quebec (30% of national herd), Ontario (25%), Manitoba (20%), Alberta (15%) and Saskatchewan (10%) (Source: Statistics Canada). Over the past 10 years, there has been a significant shift in Canadian production to the grain-growing, prairie provinces of Manitoba and Saskatchewan. Between 1991 and 2006 the Canadian pig herd increased by 40% while the herd in Manitoba increased by 130% and that in Saskatchewan by 67% (Statistics Canada; Patience 1993). Canadian pig production has, in relative

terms increased more rapidly than the US industry coming from about one seventh of US production in 1980 to about one fourth today and now Canada exports about half its production (Haley, 2004). A change in the economics of exporting grain from the prairie provinces made pig rearing more attractive than grain exporting. Canadian production was 23 million pigs in 2005.

The expansion of bioethanol from corn in the US and from wheat in Canada coinciding with tight world wheat supplies has resulted in a very great increase in feed costs in both countries and will delay further expansion and may even lead to herd contractions in both countries (Elobeid et al., 2006). Canadian pig producers are said to be suffering catastrophic losses during the second half of 2007 arising from a combination of high feed prices and low pig prices which are partly due to the appreciation of the Canadian dollar against the US dollar (Marche du Porc Breton, 2007).

6.2. South America

South America in particular Brazil has been the location for significant expansion in pig production in the recent past and both production and exports of pigmeat have been growing rapidly. Production in 2005 was 35 million head. Difficulties with animal disease notably foot and mouth can cause disruption to Brazilian exports (GAIN Report BR6622, 2006).

Major US pig producing companies have begun to develop pig production units in South America and Mexico. They are attracted by low feed prices, plenty land, plentiful and cheap labour, favourable weather, a growing domestic market and a more benign regulatory environment (Roppa, 2005). The South American pig herd numbers about 57 million head and about 65% of production is in Brazil (Roppa, 2005). The latter stated that only about 14% of Brazilian land is farmed compared with 42% in the US and 52% in the EU-15.

6.3. Other countries

Former Soviet Union Animal production in the countries of the former Soviet Union has declined severely since the break-up of the Soviet Union. Russia has become an important importer of pigmeat and is likely to remain so despite government encouragement for pig production. Russia is Brazil's most important export market (Marche du Porc Breton, 2007)

Australian pigmeat production is constrained by a high grain price partly due to restrictions on imports of whole grain. The current 2006/2007 drought in Australia will have a severe impact on pig production (GAIN Report AS6057, 2006). There has been an increase in Australian exports to countries such as Singapore over the past number of years (Mullan, 2004). Nevertheless Australia remains a net importer of pigmeat (FAS USDA, 2006)

7. The EU pig industry

The EU pig population is about 154 million head and slaughterings amounted to 245 million in 2006 (IFIP 2007; Table 7.1)

Table 7.1. EU-25 pig population and slaughterings in principal pig producing countries (2006)

Country	*Sows[1] (m)*	*Total pigs[1] (m)*	*Slaughterings (m)*	*Pigmeat (000 tonnes)*	*Self-sufficiency %[2]*
Germany	2.46	26.6	47.6	4,057	94
Spain	2.70	26.0	37.9	3,218	129
France	1.26	15.0	25.7	2,356	107
Poland	1.79	18.8	23.1	2,050	103
Denmark	1.41	13.6	22.4	1,821	617
Netherlands	1.05	11.2	14.5	1,586	232
Italy	0.77	9.3	12.9	1,514	68
Belgium/Lux	0.58	6.3	11.0	1,043	196
UK	0.52	4.7	9.2	687	45
Austria	0.23	2.6	5.3	473	100
Portugal	0.31	2.3	5.1	300	61
Hungary	0.33	5.0	4.9	606	93
Czech republic	0.34	4.0	4.2	390	78
Sweden	0.18	1.7	3.2	276	92
Finland	0.18	1.4	2.4	193	116
Ireland	0.17	1.6	2.6	239	137
Total EU 27	***15.5***	***161.0***	***202***	***21,371***	***108***

Source: ([1]) December pig census – Eurostat);; IFIP (2007); DMA (2006)
[2]Self sufficiency figures are for 2005 - IFIP

7.1. Germany

The German pig herd is the largest in the EU at about 26 million head. German pigmeat output accounts for about 19% of EU-25 output. The German herd dropped by about 20% in the early 1990s but has recovered and output in 2005 was similar to output in 1990 (ITIF, 2006). Average herd size in Germany is low at c. 66 sows. Movement of pigs from specialised breeding herds to finishing herds is an important feature of German pig production. Many finishers have left houses empty in response to high feed prices and low pig prices leaving producers of weaned pig receiving uneconomic prices through the second half of 2007. It is little wonder that sow slaughterings in Germany have increased sharply in the autumn of 2007 (Marche du Porc Breton, 2007).

7.2. Spain

Spain has the second largest pig herd in the EU after Germany and accounts for about 15% of EU-25 pigmeat production. Between 1990 and 2005 Spanish production increased by 81% (ITIF 2006). The province of Catalonia has a pig density of 534 pigs/km^2 UAA. Average herd size in Spain is low at 69 sows.

7.3. Denmark

Denmark is the world leader in producing and marketing pigmeat. It accounts for about 9% of EU output and despite a high density of pig production (525 pigs/km^2 in 2005 in Continental Denmark) has managed to increase output by over 60% between 1990 and 2005. Denmark produces about six times as much pigmeat as the home market can absorb (ITIF, 2006). Exports of live pigs from Denmark are increasing rapidly from 2.3 million in 2004 to 4.4 million in 2006.

The increase in live pig exports is causing concern to the major slaughter plants and is being attributed to stricter environmental regulations and lower labour costs in Poland which is a recipient for many of the exported pigs (Nijland, 2006).

7.4. Netherlands

The Netherlands is a major exporter of pigmeat. For many years there has been concern over the environmental effect of a high concentration of pig production especially in the south of the country and a high density of other farm animals combined with a high density of humans. Government policies have imposed restrictions on manure loadings on farms and encouraged the movement of manure to areas of the country with fewer livestock. There has also been a "buy-out" scheme for producers prepared to exit the industry and cease production.

Dutch pigmeat production has fallen by about 14% between 1990 and 2005. Nevertheless the numbers and density remain high with the pig density in the south east of the country at 1,198 per km UAA is the highest for any region in the EU. Cavan the county with the highest density of pigs in Ireland has 271 pigs/km2 UAA

7.5. France

France has about 10% of the EU-25 pig herd and production is concentrated in Brittany and surrounding provinces. Because of the high density of pigs and cattle in Brittany and a high Organic Nitrogen loading, manure processing has become common on farms. In many cases after separation of the manure into solid and liquid, the P-rich solid fraction is composted before being exported long distances to cropland and the N-rich liquid is denitrified.

This process may be environmentally unsound when the energy requirement for processing is considered but it does allow pig producers to comply with EU

legislation and stay in production. The manure being degraded could substitute for chemical fertiliser thereby saving fossil fuel and reducing greenhouse gas emissions.

7.6. UK and Northern Ireland

The UK pig industry was for a longtime a world leader in technology and productivity. The industry went into steady decline during the 1990s and currently the herd is just over half what it was at peak. Breeding pig numbers declined from 800,000 in 1998 to 448,000 in 2005 and slaughterings fell from 14.4 million head in 1995 to 9.1 million in 2005 (BPEX, 2006a). As a result UK self-sufficiency in all pig meat has fallen to about 55% (Table 7.2) to 42% in the case of ham and bacon (Figure 7.1) and to 60% in the case of pork (Figure 7.2).

Sources within the UK pig industry forecast a loss of a further 20 - 25% of the sow herd in response to producer losses in 2007.

Table 7.2. Trends in the UK pigmeat production (000 t) and market self-sufficiency

	2002	*2003*	*2004*	*2005*	*2006*
Production	836	792	796	800	781
Consumption	1,251	1,311	1,290	1,290	1390
Net imports	518	607	601	597	609
Imports % consumption	41	46	47	46	45

BPEX (2006a); DEFRA 2007

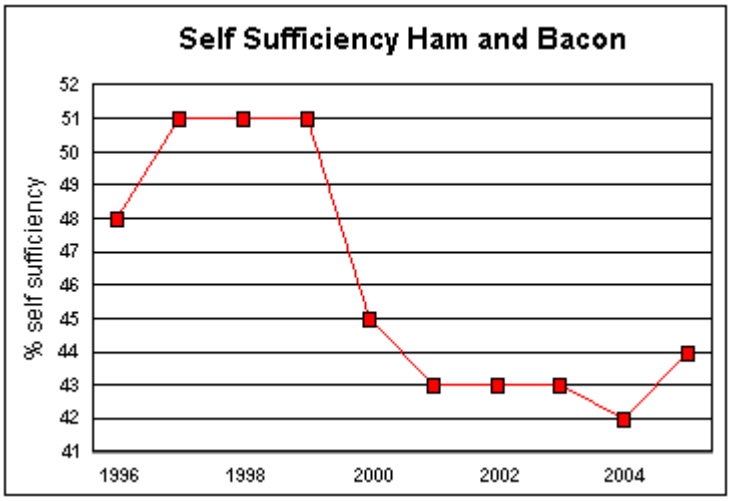

Figure 7.1. UK self sufficiency in ham and bacon (Source: http://www.ukagriculture.com/farming_today/livestock_self_sufficiency.cfm)

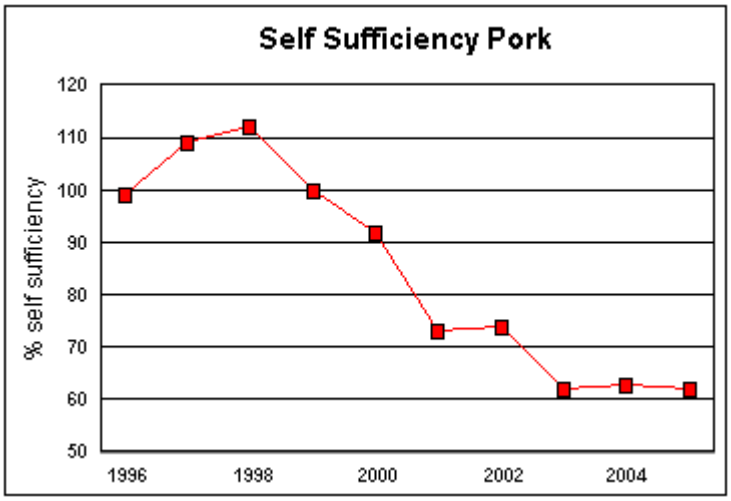

Figure 7.2. UK self sufficiency in pork (Source: http://www.ukagriculture.com/farming_today/livestock_self_sufficiency.cfm)

Within the UK breeding pigs were distributed as follows in 2005: England 81%, Scotland 10%, Northern Ireland, 8% and Wales 1% (BPEX 2006a).

The decline in the UK pig herd can be attributed mainly to low profitability but the introduction of new animal welfare legislation which was out of step with that in other EU countries (and the building investment required for compliance) was also important. Despite the stated commitment of UK retail chains to give preference to home produced pig meat and to import only pig meat produced to "UK standards" and to consumer research indicating that consumers are very concerned about pig meat imports that fail to meet ULK pig welfare legislation, about 70% of imports in 2005 are from systems deemed illegal in the UK, up from 66% in 2004. It is clear that price is the main factor in sourcing imports to the UK (BPEX, 2006b).

Other factors which contributed to the decline of the UK pig industry were the strength of sterling against the Euro and the downsizing of an excellent independent research and development service which supported the industry in earlier years.

The British Pig Executive has recently launched a programme to renew confidence in the pig industry by improved pig health, technology transfer, a more benign regulatory environment and improved pork quality (BPEX, 2006c)

The Northern Ireland sow herd has decreased over the past decade from around 70,000 in 1997-8 to around 40,000 today. Average pig unit size in Northern Ireland is much smaller than in the republic. Movement of live pigs and pigmeat between Northern Ireland and the Republic means that the island should be treated as one market.

Table 6.3. Sow population in Northern Ireland 1996 to 2003 (000)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sows	69	72	67	47	42	41	39	43	38	37	37	37

7.7. Poland

Poland has the third biggest pig population of the EU-25 and the largest of the 10 new states. In terms of output per million head in the national herd Poland is well behind the top producers in the EU-15. The industry produced about 103 to 105% of annual consumption over the past few years but Poland has recently become a net importer (Marche du Porc Breton, 2007). Pig herd size in Poland is very small with the average sow herd being only four and only 14% of sows being in herds of 100 or more (ITIF, 2006). However, Smithfield the US pig production company and some Danish firms and individuals are beginning to set up pig production and slaughtering operations in Poland. Some of this pigmeat is destined for the UK where it will compete with Irish pigmeat.

7.8. Hungary

The Hungarian pig herd has declined by 54% between 1990 and 2005 and the UK is the only other EU-25 country to suffer such a decline. Nevertheless Hungary produces about 112% of annual consumption. Average sow herd size is about 6.

7.9. Other EU

Romania and Bulgaria

Romania has about 22 million inhabitants and about 6.5 million pigs and is at present a net importer of pigmeat (DEFRA, 2006a; Garnier, 2006). According to this report, annual pork consumption is about 29kg/person and imports (mainly from Germany) account for about 25% of consumption. While most pigs are produced in small units, Western companies are developing commercial units and in the long term the country is considered to have export potential (Garnier, 2006).

Bulgaria has a population of about 7.5 million but only about 0.9 million pigs. Pork production fell by over 50% between 2000 and 2006 (FAO, 2006b). While there is rising demand for meat including pork import policies restrict imports and the small size of units will limit output in the short term (GAIN Report BU6007, 2006)

8. Pigmeat consumption pattern and trends

8.1. Global

The countries with the highest per capita pigmeat consumption are shown in Table 8.1. Major beef eaters are Argentina 65kg/head, Australia 37 kg/head and Brazil 37kg/head (FAS USDA 2006).

Table 8.1. Per capita meat consumption in selected countries 2006 (ranked on pigmeat consumption).

	Beef	Pigmeat	Broiler
Hong Kong	15	66	37
EU-25	18	44	16
China	6	40	8
Taiwan	5	41	30
US	43	30	46
Canada	32	27	30
Korea, South		27	13

Source FAS USDA, 2006

8.2. EU

Per capita pigmeat consumption in some selected EU countries is shown in Table 8.2. Per-capita pork consumption in the EU is increasing especially in the newer member states as household incomes rise (GAIN Report E36107, 2006).

Table 8.2. Per capita meat consumption in selected EU countries, 2001 (kg/head/year)

	Total meat	***Beef & veal***	***Pigmeat***	***Sheep and goat***	***Poultry***
Belgium/Lux	94	20	46	1.8	18
Denmark	114	23	63	1.3	21
Germany	88	10	54	1.1	19
Greece	91	19	32	13.5	20
France	107	25	37	4.2	26
Italy	91	23	38	1.6	18
Netherlands	87	19	43	1.4	22
Austria	98	18	56	1.2	18
Portugal	103	15	44	3.4	32
Finland	63	12	32	0.3	15
Sweden	73	21	35	1.0	14
UK	83	19	25	5.7	28

Source: Eurostat – Agriculture Statistical Yearbook 2001. Table 3.13

8.3. Ireland

Per capita consumption of pig meat in Ireland is 38.4 kg per year and is significantly greater than any other meat. (Table 7.3). Between 1992 and 2002 total meat consumption increased from 86 to 93kg per person and most of this was due to an increase in poultry meat from 23.5 to 30.5kg.

Table 8.3. Per capita consumption of meat in Ireland 2002

Meat	***Kg per person***
Pigmeat	38.3
Poultry	30.5
Beef	17.5
Sheep	5.2
Other	1.6
Total	***93.1***

Source: CSO

There is little reliable information on the demographic profile of pork purchasers and pork consumers in Ireland or on their opinions on pork quality. This information is urgently needed if producers and processors are to respond to market demands.

Comparisons of Irish consumers' beliefs about pork and poultry showed that poultry is viewed as the tastier, healthier and less expensive of the two meats while pork is viewed as the safer meat. In the case of pork, health, eating enjoyment, safety and animal welfare were most important determinants of attitude with environment and price less so (McCarthy et al., 2004). In the US there are racial, urban versus rural and income differences in pork consumers. Their data suggests that the elderly and people on higher incomes consume less pork (Davis and Lin, 2005).

8.4. Points of purchase of pork and bacon products

The multiple retailers are dominating the pigmeat market with the share of butchers declining. While butchers account for about 11% of total meat and poultry sales in Ireland they account for only 6% of pigmeat sales (Bord Bia, unpublished).

8.5. Niche markets

Niche markets, by definition, are small and the premium price for premium cuts is usually not sufficient to compensate for the lack of a price bonus for the remainder of the carcass which must be sold on the commodity pigmeat market. In Ireland the scattered nature of the human population makes it difficult to economically service a niche market outside the larger population centres. While some individuals may develop and service niche markets, these outlets, in Ireland, are unlikely to absorb significant quantities of pigmeat.

In the US Honeyman et al (2006) claimed that 35 to 40 niche marketing groups were active in Iowa in 2003 - some based on superior eating quality of particular breeds such as Berkshire. These groups utilise various sales methods including Internet sales, local abattoir sales, direct marketing, farmer networks, and targeting to organized groups.

In France sales of "Label Rouge" pork have increased about 6-fold from 1990 to 2002 but has remained stable since then at about 1.2% of national pig output. "Label Rouge" refers to meat which is produced to defined standards of management and feed ingredients but is neither organic nor necessarily free-range.

The fatty acid profile of carcass fat in pigs is very responsive to the fatty acid profile of the diet and therefore it is relatively simple to change the concentrations of poly-unsaturated, mono-unsaturated, omega-3 fatty acids if a particular market requires this "healthier pork" (Lynch and Kerry, 2000).

8.6. Organic pig production

Organic pig production in Ireland is insignificant. The shortage and high price of organic feed ingredients is a barrier, while the small size of the organic feed market makes it difficult to attain a critical mass for manufacturing feed. Organic poultry production faces similar constraints (O'Connell and Lynch, 2004). Organic pigmeat must be produced according to specified standards of feed (in particular the use of organic ingredients), housing and healthcare and must be certified by one of a number of organic bodies e.g. Irish Organic Farmers and Growers Association (IOFGA, 2006).

8.7. Free Range and outdoor production

In the late 1980s there was a significant investment in large-scale outdoor pig production operations in Ireland with in excess of 5% of the sow herd being outdoor at one time. Failure to achieve the expected premium price, low sow productivity, feed wastage and difficult working conditions (as a result of unfavourable weather, especially rain) combined to make out outdoor pig production unprofitable and today only a very small number of sows are kept outdoors. Control of Salmonella, which is a food safety concern, is more difficult in outdoor operations to which wildlife has access.

Soil type and rainfall are important in determining whether outdoor production is practical. Usually, outdoor production means that only the sows are kept outdoors with the growing pigs being brought indoors to straw bedded or conventional slatted housing at weaning. Feed usage is generally higher in outdoor systems (due to wastage, consumption by birds and the animals being below their lower critical temperature at times) and productivity is lower as a result of higher mortality. Labour use is higher but housing costs are low.

Often, e.g. in the UK the area devoted to the pigs is part of the rotation on a tillage farm. It is unlikely that outdoor pig production will become significant in Ireland in the foreseeable future.

8.8. Straw based semi-outdoor production

Rearing of pigs in straw yards, which is a feature of UK production, is not popular in Ireland though it was the norm a generation ago. These units often have access to open yards but not to grazing. Shortage of straw in the pig rearing areas, the cost of handling solid manure, inefficient use of feed and the difficulty in maintaining hygiene levels are contributory factors. As with free range production, pigs in these systems are vulnerable to Salmonella infection from wildlife.

8.9. Market outlook

The global market outlook for pigmeat is good with worldwide consumption expected to continue to grow even if the growth rate is expected to slow to 1.5 to 1.7% per year during the next 10 years (European Commission, 2007). The challenge for the Irish pig industry is to be competitive on production costs and secure consumer loyalty in the market.

Consumer studies from Bord Bia (Donoghue, 2007) have identified a number of challenges for the pig meat sector including:

- convenience is very important in selection of meat,
- children tend to eat less pork than in the past
- pork is seen as more difficult to cook than chicken or beef
- pork is not seen as particularly healthy.

The industry needs to be more conscious of consumer priorities and support pork quality feedback mechanisms.

9. Pigmeat Trade

9.1. Global

The principal pigmeat exporting countries are the EU, US, Canada and Brazil (Table 9.1) and the principal importing countries are Japan, Russia, US and Mexico (Table 9.2). Note that a number of countries are in both lists.

Table 9.1. Principal global pork exporters (2006)

		!000 tonnes carcass wt equivalent	% of world exports
1	EU-25	1,400	27
2	US	1,346	26
3	Canada	1,100	21
4	Brazil	540	10
5	China	500	10
6	Chile	124	2
7	Mexico	65	1
8	Australia	56	1
	Total	**5,178**	**100**

Source: Foreign Agricultural Service, USDA, 2006

Table 9.2. Principal global pork importers (2006)

		!000 tonnes carcass wt equivalent	% of world imports
1	Japan	1,250	30
2	Russian Federation	800	19
3	USA	463	11
4	Mexico	450	11
5	Hong Kong	310	7
6	Romania	288	7
7	Republic of Korea	254	6
8	Canada	140	3
9	Australia	90	2
10	Ukraine	45	1
11	Taiwan	33	1
	Total	**4232**	**100**

Source: Foreign Agricultural Service, USDA

9.2. Within EU

Within the EU, Denmark is the principal exporter and the UK is the main importer. In terms of self-sufficiency in pigmeat, Denmark is highest of the EU-25 while Greece and the UK are lowest (Table 7.1 above). The large deficit

in the UK is especially important on account of its large population and proximity to Ireland.

10. Irish exports and imports of pigmeat

While Ireland is about 160% self-sufficient in pigmeat there are substantial imports as shown below. Some of the imports are re-exported after processing. Backs and loins account for a high proportion of the imports. This is at least in part due to a consumer preference for pork from the back or loin (Bord Bia, 2002; Slevin, 2002; Hughes 2004). There is also an increase in demand for non-traditional products such as Parma ham.

10.1. Exports

Between 1992 and 2006 the volume of pigmeat exported varied from a low of 100,000 tonnes in 1992 to a high of 135,000 in 1999. The destination of pigmeat exports in recent years is shown in Table 10.1. The UK accounts for about half the volume exported. Exports to Japan vary widely from year to year and reached 16,000 tonnes in 1999. Russia was an insignificant market in the early 1980s. Pigmeat exports were worth €250 million in 2006.

Table 10.1. Destination of pigmeat exports from Ireland 2001 to 2006 (1,000 tonnes)

	2001	2002	2003	2004	2005	2006
UK (incl. NI)	65	66	56	56	62	68
France	16	7	4	3	4	6
Germany	16	11	12	10	12	11
Italy	8	6	4	3	3	3
Other EU	10	9	8	8	11	12
Japan	3	2	6	10	11	11
Russia	5	8	6	5	2	6
USA	1	3	2	4	3	2
Other non-EU	4	4	3	5	6	6
Total	***126***	***114***	***102***	***104***	***114***	***125***

Source: DAFF Compendium of Statistics 2007

10.2. Imports

Imports of pigmeat to Ireland have increased substantially in recent years (Table 10.2).

10.3. Live exports

Exports of live pigs to Northern Ireland (NI) for slaughter have increased substantially in recent years (Table 10.3). This is due an excess of slaughter capacity in NI.

Table 10.2. Origin and volume of pigmeat imports 2000 to 2005 (1,000 tonnes)

	2000	2001	2002	2003	2004	2005	2006
GB	12	13	13	17	20	18	
Northern Ireland	5	3	3	4	4	4	
Denmark	4	6	5	5	9	9	
Netherlands	9	8	9	7	5	6	
Other EU	7	13	18	21	27	32	
Non EU-15	<1	<1	<1	<1	<1	<1	
Total	37	44	48	54	66	70	

Source: CSO (trade data)

Table 10.3. Volume of live pig exports to NI 2000 to 2005 (000)

2001	2002	2003	2004	2005	2006
269	306	387	426	519	475

Souce: Dept of Agriculture; Bord Bia

11. Pigmeat processing

11.1. Slaughtering

The number of pigs produced in Ireland increased from c. 2.0 million per year in the mid 1980s to over 3.0 million in 1993 and has fluctuated between 3.0 and 3.4 over the past several years. The number of pigs slaughtered is less than this due to exports of live pigs for slaughter in Northern Ireland. The slaughtering sector consists of three medium size plants (9,000 upwards per week) and a number of smaller plants (up to 4,000 per week). Following a fire in the middle of 2007 the plant at Glanbia Edenderry closed but has been reopened. The weekly kill at Glanbia Roscrea has been temporarily increased.

The small scale of Irish plants places them at a significant cost disadvantage compared with larger plants. A comparison of the cost structure of Canadian pigmeat plants (average capacity 3,000 per day) versus US plants (average capacity 13,000 per day) placed the advantage of the larger US plants at close to €5.20 per pig (Grier and Mussell, 2007).

11.2. Location of slaughter plants

The location of the main slaughter plants and their weekly kill is shown on the map below (Figure 11.1).

The small size of slaughter plants in Ireland is very clear when compared to France where nine plants slaughter more than a millions pigs each per year (20,000 per week). Eight of the nine are in Brittany, an area not much larger than Munster, while the ninth is located in Pays de Loire close to the border

with Brittany (ITIF, 2006). The ten largest plants in France had a combined slaughter of over 13 million in 2006 and the largest (Cooperyl Lamballe) slaughtered just over 2 million (IFIP 2007).

In Denmark Danish Crown (11 plants) slaughtered 18.7 million pigs in 2006, follwed by Tican which slaughtered 1.6 million. Together these two accounted for 79% of pigs produced in Denmark with private slaughterhouses taking 4% of production and live exports 17% (4.4 million pigs) (Source: www.danishmeat.dk).

11.3. Relations between slaughter plants and suppliers

While few pig producers have formal contracts with meat plants, most would supply all pigs to a single plant on a regular basis. However, there is sufficient mobility among some suppliers that slaughter plants will only be certain of 75 to 80% of the following weeks supply by Friday afternoon. As a result factories often operate under capacity with consequent inefficiencies and higher per pig costs. Grier and Mussell (2007) estimated that a in a large slaughter plant (40,000 per week) a drop in capacity utilisation from 91% to 89% would result in an increase in slaughter cost of €0.80 per pig.

Competition by plants (including those in Northern Ireland) for the marginal pigs is seen by producers as necessary for meat plants to pay a "reasonable price".

Pig producers in Ireland express a high level of distrust of meat plants while meat plants expect little loyalty from suppliers. Relations have improved in recent years but still fall well short of the arrangements that exist in other countries. Such trust would make long term supply contracts possible with consequent improved factory efficiency.

Lack of committed supply has been identified as a factor in the closure of some independent plants in the US, the decline of single plant operations and the success of the very large integrated operators (Informa Economics Inc, 2005). In Alberta, there is a move to form a "collaborative model" of pig production where elements of the integrator model of the US industry and the co-operative model from Denmark would be combined by all sectors of the industry (feed, processing, producer) collaborating towards a common goal and sharing the profits from the production chain from farm to fork (Buoma, 2006). The author recognises the challenges of changing attitudes in Canada from one of confrontation between producers and processors.

Meat plants need to engage with pig producers and explain exactly what type of pig (genotype, carcass weight, conformation etc) is required by high-return markets. At present, when pig supplies are tight, carcass specification appears to become a secondary consideration to maximising throughput.

Statistics on cross-border movement of live pigs should be collated and published promptly and regularly.

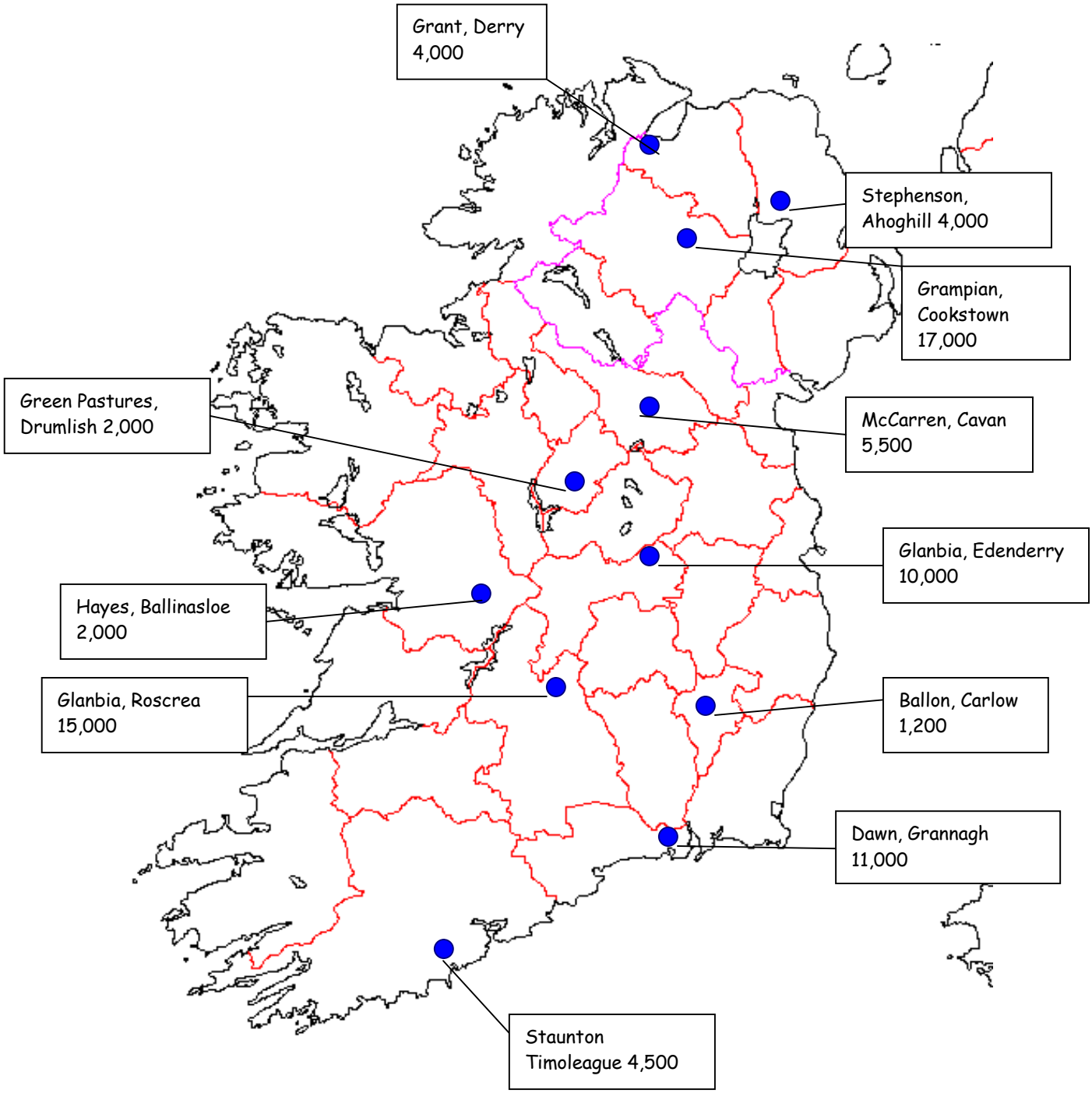

Figure 11.1. Location and approximate weekly kill of slaughter plants, 2007

11.4. Secondary processing

There are a large number of secondary processing plants who source pigmeat either home produced or imported for processing and/or curing and sale to the retail sector. There are many successful firms involved in this sector of the pigmeat industry and they receive technical and training support from Enterprise Ireland. The development of added value products is consistent with government policy as set out in Agri Vision 2010 (2000) and Agri Vision 2015 (2004). While it might be desirable that these firms might source their pigmeat in Ireland they cannot be compelled to do so. They can be expected to do so if the product of the specification they require is available at a competitive price.

Consumer demand for pigmeat is likely to continue to shift towards greater convenience (BPEX 2006c).

There is little or no feed back from these processing operations to the primary producer. This is regrettable since these firms are likely to be innovative in their product lines and presentation and might have preferences for raw material with particular attributes e.g. increased level of intramuscular fat.

12. Carcass payment system

Payment for pigmeat is based on carcass lean content within a specified weight range. Within the preferred weight bands the basic price quoted for pigs is for a carcass lean content of 54% with price adjustments of 2.54c/kg for every 1% lean above and below 54% within the range 48% to 60%. Most pigs are delivered to the plant by the supplier and a delivery bonus at a negotiated agreed rate per pig is usually paid. This bonus is not related to the cost incurred in making the delivery.

It is not clear that the current pricing grid is still that which best serves the market and a reassessment of the pricing system is overdue.

12.1. Lean meat calculation

The EU system of grading pig carcases was introduced in Ireland with effect from 1 January, 1989, under the Pig Carcase (Grading) Regulations, 1988. The 1988 Regulations have since been amended on a number of occasions (based on dissection of a representative sample of carcasses) the most recent being S.I. No. 413 of 2001 –European Communities (Pig Carcase (Grading)) (Amendment) Regulations (2001). The majority of carcasses are graded using the Hennessey Grading Probe. Back fat thickness and muscle depth are measured using this instrument at a point 6 cm from the edge of the split back at the level of the 3/4 last rib. Lean Meat percentage is then estimated according to the following formula:

$$\text{Lean Meat \%} = 60.30 - 0.847x_1 + 0.147x_2$$

where x_1 and x_2 represent back fat and muscle depths as measured by the Hennessy Grading Probe above.

Under the grading legislation, all plants slaughtering in excess of 200 pigs per week are obliged to grade pigs on a lean meat basis. Slaughtering plant operators must furnish producers with a statement showing carcase number, carcase weight, estimated percentage lean meat content and total price paid for each pig. In practice pigs are rarely assessed for carcass lean content outside of the three larger plants and tend to purchased on a flat rate basis.

The formula used to predict carcass lean by the grading probes is biased in that it estimates gilts to have a higher lean meat percentage than entire boars. This is a function of the location at which measurement is carried out with males having both a thinner backfat and thinner eye muscle at that point i.e. between the third and fourth last rib.

There is a need to confirm the accuracy of the grading formulae periodically (every 5 to 8 years) as genotypes, management practices and slaughter weights change.

There is distrust of the accuracy of the carcass grading system, claims of consistent differences between plants and of variation between operators within plants. This distrust is fuelled by the knowledge that there is little discernible difference between producers with most having an average carcass lean content of 58 to 58.5%.

This is close to the limit of 60% at which bonuses for carcass lean content cease to be paid. If lean content is important, then the upper limit for payment should be reassessed by negotiation between meat plants and pig producers. Trust in the objectivity and reliability of the grading system would be enhanced by more rigid monitoring by the Department of Agriculture and Food and by their insistence that all plants, which are required by law to do so, carry out carcass grading.

12.2. Preferred weight bands

Carcass weight at slaughter has shown a steady increase from c. 65kg in 1995 to 75kg in 2005 (PigSys 2005). An increased incidence of boar taint is a risk and is probably inevitable with heavier pigs.

According to S.I. No. 434 of 1997, "un-castrated male pigs with a carcass weight in excess of 80 kg, giving off, in the opinion of a veterinary inspector or an authorised officer, a pronounced boar taint are to be marked and undergo one of the treatments provided for in S.I. No. 126 of 1995 ". This legislation would

appear flawed as boar taint is only detected during cooking and sophisticated on-line detection methods for the main responsible compounds, skatole, and androstenone, are not in commercial use.

The slaughter weight of pigs in Ireland is dictated largely by the minimum and maximum weight limits set by the main processors and by their competitors for pigs in Northern Ireland. Each processor has its own preferred weight range. Table 12.1 shows the minimum and maximum weight limits for pigs at a typical plant. It also shows the corresponding maximum and minimum liveweight bands that should be used by producers to avoid price penalties.

Table 12.1. Range in sale weights to achieve maximum base price (typical plant limits)

	Min	Max
Upper dead weight limit (kg)	55	90
Safe kill out (%)	71	78
Live weight limit (kg)	77.5	115

Failure by a producer to comply with the maximum and minimum weights can be very costly as discussed by Lawlor (2003) in Table 1 and Hawe and Donnelly (2007).

Table 12.2. Deductions made by two processors for under and over weight pigs[9]

Factory A		Factory B	
Wt. Range (kg DW)	Penalty (c/kg)	Wt. range (kg DW)	Penalty (c/kg)
0-45	No payment	18.3-44.9	-17
45-49.9	-50.78	45-48.9	-11
50-54.9	-12.69	49-50.9	-8
55-79.9	0	51-52.9	-4
80-89.9	-1.2	53-54.9	-3
90-99.9	-2.54	55-85.5	0
100+	Sow price	85.6-90.9	-9
		91-99.9	-31
		100-134.9	-59

[9]*Information from plants*

Processors will, however, accept pigs heavier than their maximum declared weight limit from specific customers and especially in times of short supply. Availing of this increase in slaughter weight (without penalty) is quite profitable for the producer, since on a cost per kg dead weight basis, feed costs remain relatively unchanged while non-feed costs are reduced.

There is some evidence that meat plants are finding difficulty in supplying some products e.g. bone-in hams of the weight specification preferred by customers (even if bone-in product is declining in importance) and of pork loins having to be trimmed (with the trimmed portion down graded) to meet buyer weight specifications.

Allen *et al.* (2001) reported on a factory survey (7 plants) of 350 pigmeat samples (boars only) carried out in 1997 using a sniff panel of four trained women known to be capable of detecting boar taint. They found that 8% of samples had definite boar taint (detected by four out of four panellists) which was similar to the findings of a survey carried out 4 years earlier. An additional 10% of the samples were described as having a high probability (three out of four panellists detected taint) of having taint.

In general there was a very weak relationship between carcass weight and the incidence of boar taint. However, closer examination of the data shows that the detection level (by at least one member of the sniff panel) increased by to over 70% when carcass weight exceeds 85 kg dead (Table 12.3).

Table 12.3. Detection of boar taint by a trained panel of 4 women

Weight range (kg)	55-60	60-65	65-70	70-75	75-80	80-85	>85
% of samples with taint[q]	53	65	52	50	57	58	71

[q] *Taint detected by one or more of the 4 sniff panellists*

The sensitivity of Irish consumers to boar taint would appear to be lower than that of other European consumers with the exception, perhaps, of the British. However, as we export a considerable proportion of pigmeat produced in Ireland we must endeavour to minimize its occurrence, so that market share is maintained. The trend towards increasing slaughter weight in Ireland must for this reason be monitored carefully due to its link with the increase in compounds responsible for boar taint and in particular androstenone. Surgical castration of pigs is likely to be banned, by the EC in the near future (possibly 2015), for animal welfare reasons and should not be considered as a long term remedy for boar taint. It would seem prudent for processors to allow the slaughter of gilts up to heavy weights but set strict upper weight limits on entire male pig carcasses.

A study by Mullane (2004) who compared slaughter weights from 80 to 120kg liveweight showed that the concentration of androstenone in backfat from boars increased by 70 % when live weight at slaughter increased from 80kg to 100kg and by 87% from 80kg to 120kg.

Meat plants need to remind suppliers regularly, in writing, of the weight ranges and conditions of payment applied. They should also provide suppliers with

quarterly summary of pigs supplied detailing kill-out, weight distribution, lean content and condemnations. The PIGIS system of carcass weight analysis used in Northern Ireland (Hawe and Donnelly, 2007) would appear to be ideally suited to this task.

12.3. Kill out percentage

Pigs are selected for sale based on liveweight and likely carcass weight. Kill out percentage or carcass yield is important in this planning. There is no standard procedure for obtaining live weight of pigs prior to marketing and so allowing calculation and comparison of kill out. Weighing may be done on the farm, en route or at the factory intake. Results are confused by variation in fasting time and feeding method as well as weighing procedure. Factory returns should show live weight of the truck load on arrival as well as carcass weight. This would focus attention on fasting (with benefits to meat colour) as well as condemnations.

12.4. Alternative grading/evaluation systems

There is a need for ongoing monitoring on developments in carcass grading/assessment internationally. At the very least the prediction equations should be re-validated but ideally new and more accurate grading systems should also be considered e.g. CT scanner and more sophisticated probes. The present prediction formulae are based on dissections carried out about ten years ago when slaughter weights were lower and genetics were different. The use of the CT scanner as a reference method would reduce the number of total carcass dissections to be carried out and greatly reduce the cost of periodic calibration of the grading probes.

12.5. VAT refund

Most pig producers are not registered for VAT and to compensate for VAT paid on inputs these producers receive a flat rate refund added to the pig price. This is currently set at 5.2%.

12.6. Statutory and non-statutory deductions

The deductions described in Table 12.3 are made from the sale price. Both voluntary levies (IFA and research) yield much less than the theoretical amount due to deficiencies in the collecting mechanism and some producers choosing to opt out of payment. In addition, smaller plants deduct only the statutory levies and levies are not collected from live exports to Northern Ireland.

Compared with other countries the contribution of Irish pig producers toward marketing, producer representation and technology transfer is insignificant as shown in Table 12.4.

Table 12.3. Statutory (compulsory) and voluntary deductions from payments

Description of charge	Type of levy	€ per pig	Reason
Bord Bia	Compulsory	€0.25	Marketing and promotion
Veterinary	Compulsory	€1.30	Food safety
Irish Farmers Association (IFA)	Voluntary	c. €0.15*	Producer representation
Research	Voluntary	€0.08	Research and Development

** IFA Levy – 0.15% of Gross value including VAT minus transport allowance*

Table 12.4. Statutory and voluntary deductions/levies/payments in selected EU countries (cent/pig) 2005

Charge	*AUS*	*BEL*	*DK*	*FRA*	*GER*	*GB*	*IT*	*NET*	*SWE*
Office and professional fees		16	40			57	42		
Research				15		29			
Marketing	73	175	74	1	51	95		146	94
Animal health				19	30				
Meat inspection / carcass classification	40			45	30	105	42		
Total	**113**	**191**	**114**	**80**	**111**	**286**	**83**	**146**	**94**

Source: INTERPIG

13. Pig meat quality issues other than leanness

Leanness is the only meat quality attribute that is paid for by the processor and for this reason there is very little incentive for the producer to adopt technologies or practices that improve the eating quality.

13.1. Appearance

The appearance of meat products is very important in the purchase decision of consumers. Consumers expect meat products to have attractive colour and a desirable fat to lean ratio. However, when cooked the appearance of meat appears to be less important than tenderness, juiciness and flavour/aroma.

Pale soft and exudative (PSE) is a condition which in pork will negatively affect the colour and appearance of raw pork. The pale and/or uneven colour of the meat and presence of exudates on display trays is not appealing to consumers.

Genotype was in the past the main cause of PSE but selection has almost eliminated the trait from breeding stock. The condition now arises mainly due to poor (stressful) pre-slaughter handling practices on the farm, during transit and at the slaughter plant (especially immediately pre-stunning). Post-slaughter practices can also contribute to the development of this condition in carcass

muscle. This can particularly be the case where chilling of carcasses to c.4^{0}C is delayed.

O'Neill et al. (2003) found a higher incidence of PSE in one pigmeat plant in December-January, among pigs from particular suppliers and among pigs slaughtered on Fridays and attributed this to inadequate resting pre-slaughter.

Colour of pork is an important consideration in the purchasing choice of a customer. Irish consumers typically prefer pork of a pale colour while consumers elsewhere e.g. Japan prefer pork of a redder colour.

13.2. Eating quality

There are frequent claims from the popular media and from controlled studies that pork eating quality has deteriorated as genetic selection has reduced carcass fat levels and leaner breeds are used. E.g. a recent article in USA To-day highlighted the use of fatter breeds in celebrity restaurants (Wuskowitz, 2007).

Juiciness

This is an important component of the eating quality and is determined by the amount of moisture present in the cooked muscle. PSE pork will be drier than normal pork. Apart from this, the cooking process has a major impact on the juiciness of pork. "Well-done" pork will be less juicy than less well done pork. Increasing the internal temperature from 60 ^{0}C to 80 ^{0}C results in reduced juiciness and moisture content in cooked pork.

Tenderness

Tenderness is the most important factor in consumer acceptance of meat. To maximise tenderness, cold shortening must be avoided, a high level of intramuscular fat should be present and the level of connective tissue must be minimised.

Flavour/Aroma

Flavour and aroma are the result of a large number of compounds but it is difficult to identify all of the constituents that contribute to these sensations. Off-flavours are potentially a larger problem associated with pork palatability than the intensity or desirability of the flavour of normal pork.

Boar taint is an unpleasant odour that is released during the cooking of pig meat from entire male pigs. However, only a proportion of boars produce this odour and not all consumers are sensitive to it. Nevertheless it is a potential problem for the industry, since one bad experience could put a person/family off pork for life (see section 12.2).

Improving eating quality
Pork of higher intramuscular fat content has better taste and eating quality. Genotype is an important influence e.g. use of Duroc sires. Feeding high density feed and rapid pre-slaughter growth rate are also important. Fatter pigs tend have poorer feed conversion efficiency and the producer will not be rewarded for producing pork of superior eating quality.

There are a number of processes which if applied at factory level could potentially improve eating quality but these have not been adopted so far by the industry:

- Electrical stimulation to accelerate rigor development
- Aitchbone hanging to improve tenderness
- Carcass aging – The improvements in tenderness due to aging are rapid in the first 1-2 days, then continue at a slower pace and plateau at around 6 days post-slaughter.
- Enhancement of pork quality through injection of pork with brine solution or for example a 5% polyphosphate solution.
- Monitoring of muscle pH

There is an urgent need for feedback from consumers on their experience with the eating quality of Irish pigmeat. The increase in weight, use of heavier boar pigs etc may have changed eating quality as perceived by the consumer. There is also need to benchmark the eating quality of Irish pigmeat against that of imported pigmeat which has a significant share of the market.

14. Breeding and Genetics

Traditionally Ireland's pig genetic base consisted of numerous small, family operated independent breeders. These breeders selected their best animals by visual conformation and individual performance and entered them in livestock shows.

For about 30 years (1960 to 1990) a government breeding programme based on within-herd recording and performance testing of boars in two test stations resulted in rapid improvement in carcass leanness in Landrace and Large White breeds. This was supplemented by importations of superior stock of these two breeds

The best animals from the test programme were sold to commercial producers thereby disseminating the gene pool and improving the national genetic base. This system has completely changed over the last 20 years due to health concerns regarding centralised testing, elimination of the traditional small breeders and the large scale use of AI on commercial units.

A comparison of seven sources of semen from terminal sire lines available in Ireland in 1997 revealed significant differences in growth rate, feed conversion efficiency and carcass traits (Lynch et al, 1998). In view of the significantly lower growth rates recorded on Irish pig herds the industry should consider a repeat of the previous study using imported frozen semen from e.g. Denmark, France and Netherlands to benchmark the current Irish gene pool.

There are now two genetic companies who share the majority part of the Irish market (~90%) with the remaining market share been split among a number (about three) of smaller companies. These companies use their own nucleus herds and BLUP breeding technology to select for the desired traits. While both import stock from a number of other countries, the narrow genetic base in the Irish pig population is a concern.

14.1. Current national herd performance

The current genetic performance of the Irish herd can be evaluated on (1) number of pigs born alive per litter, (2) average daily gain (ADG) and (3) feed conversion efficiency (FCE). The average ADG and FCE for the Irish herd is 598g/d and 2.46 from weaning to slaughter (Pigsys, 2005).

For a period in the 1980s/1990s, the Irish herd was the best in Europe (and indeed in the world) based on number born alive and sow output per year. The country's temperate climate, skilled work force, substantial investment in facilities and high health status in conjunction with a good genetic base all contributed to this high prolificacy. In recent years the national ranking in comparison to other countries has slipped. Denmark and France have both seen huge increases in number of pigs weaned per litter between 1996 and 2006 (Roguet, 2007).

Table 14.1 below shows the number born alive per litter of the Irish herd in comparison to some other European countries. Despite higher pre-weaning mortality in those countries with a higher litter size there is a trend towards high numbers weaned especially in Denmark and France.

Table 14.1. Number of Pigs born alive per litter, pre-weaning mortality and no. weaned in selected European countries (Interpig 2004)

	Ireland	Denmark	France	Sweden	N'lands
No. born alive	11.2	12.7	12.5	12.1	11.9
Mortality %	9.3	13.1	14.4	14.7	12.3
No. weaned	10.2	11.0	10.7	10.3	10.4

14.2. Artificial Insemination

The majority of pig units now use close to 100% AI. The number of units undertaking on-farm collection of semen has diminished in recent years primarily due to variable fertility, ease of commercial AI deliveries and use of long life semen extenders by AI studs. AI now plays an increasingly important role in genetic improvement due to the majority of Irish units using the criss-cross breeding program resulting in AI being the only source of external genetic input.

14.3. Breeding Programs on commercial farms

Traditionally a significant percentage of Irish units would have purchased small numbers of gilts on a monthly basis or when required. While this system is still common it is becoming less popular due to the increasing cost of gilt delivery, disease concerns and the lower cost of producing home reared gilts.

The majority of Irish units use the **Criss-Cross** breeding program to obtain their sow replacements. This system is simple, cheap and eliminates the disease risk of bringing in animals. However, a proportion of hybrid vigour is lost thereby limiting the rate of genetic advancement which results in a failure to maximize the genetic potential of the herd. This loss of hybrid vigour may be a contributing factor to the reduced rate of progress e.g. in litter size when compared to other countries.

The other main breeding system is the installation of an **on-farm purebred nucleus** to produce on-farm replacements. This system has not been widely used in Ireland to date. It requires a nucleus of purebred lines to be purchased and these are then bred to produce the F1 gilts required for herd replacement. This system has a high initial start-up cost and requires very good management. The benefits are that increased uniformity is achieved in the slaughter generation and maximum hybrid vigour is achieved in the replacement gilts while the herd can still remain closed to incoming stock.

14.4. Breeds and crosses of choice

The breeds or strains that are being used can be broken down into Damlines and Sirelines.

Damline: The Landrace x Large White (F1) is the most common genetic cross for replacement gilts. There has recently been an increased inclusion of damline Duroc as part of a three way cross (50% LW, 25% DR, 25% LR), This is claimed to produce a gilt/sow which is more robust for the loose sow systems thereby reducing the cull rate of young sows arising from injuries.

Sireline: The Irish industry has focused on producing a slaughter pig with a high LM %. The sires used to produce this slaughter generation are either a pure Large White or a Large White/Pietrain cross. With the introduction of the PMWS disease into this country in the last few years the industry quickly began

using a 50% or pure Pietrain sire as an aid to combating the disease and a significant proportion of the industry is now using a Pietrain based sire to produce the slaughter generation. This is producing a pig which is still very lean but may not be growing as fast as the Large White or a Large White/Pietrain cross which is something that the industry will have to give increased attention. With the introduction of commercial vaccines for PMWS there is now less need for reliance on the use of Pietrain in terminal sires

14.5. Future Direction of on-farm breeding programmes

The genetic input into the pig industry is a critical component for future success. The aim for the future should be to increase unit throughput by an increased number born alive and better growth rates. The industry has a good genetic supply but this may not be utilised properly at farm level thereby failing to maximize the genetic potential. The current **Criss-cross system** needs to be reviewed in favour of a **closed herd nucleus program** which would allow a more precise means of producing replacement stock, maximizing hybrid vigour while minimizing any biosecurity risk of incoming stock. Linkage with a BLUP system in large herds would further increase the rate of genetic improvement while minimising the risk of disease transmission via breeding stock. Recently this service (used for some years in the US and Netherlands) has also become available to Irish breeders.

The focus of sirelines needs to be re-examined. The traditional approach of producing a lean animal has reduced the emphasis on growth rates. The industry appears to be satisfied with the current level of leanness and therefore the priority should now be to produce an animal with an increased appetite and growth rate without depressing carcass lean meat percentage or FCE.

15. Trends in production efficiency and profitability

Pig production was, in the past, notorious for the cyclical nature of production, prices and profitability with periods of high profits being followed by expansion in production, market oversupply and low prices. Specialisation and large unit size has made production less responsive to sudden changes in profitability but has meant that period of low profitability longer. E.g. the low prices in the 1998/1999 period has left a legacy of low investment in production facilities and many unit today are in need of substantial refurbishment and upgrading. A proposal at EU level for the establishment of a Regulatory Fund to cope with cyclical nature of international markets (Agri Food 2010, 2000) does not seem to have progressed.

15.1. Pattern of nominal producer prices, feed prices and margins

The producer price for pigmeat (in nominal terms) has fallen over the past 15 years but feed prices have also fallen (Table 15.1). Margin over feed has fluctuated widely from year to year. While this variation is outside the control

of the industry it does not inspire confidence and makes financial forecasting and planning very difficult. The present year has seen feed prices rise by over 30% leaving most producers in a loss making position in late 2007.

Table 15.1 Pig and Feed Prices and Margin over Feed Cost per kg Dead Weight. 1991-2006

PERIOD	1992-1996	1997-2001	2002-2006
FEED PRICES (€ per tonne)			
Creep Pellets	678	719	797
Link Pellets	451	456	493
Weaner Pellets	280	259	258
Dry Sow Meal	211	186	187
Lactating Sow Meal	220	200	204
Finisher Meal	217	195	199
Composite Meal	**235**	**215**	**217**
Feed Cost per kg Dead Weight c	92	82	83
PIG PRICES (c per kg dead)			
Finisher	142	127	135
MARGIN OVER FEED (c per kg dead)	**50**	**46**	**57**

For individual years see Appendix Table 3.

There is need for a market and policy analysis and strategic forecasting service including international benchmarking of productivity and production costs that would help producers make better informed business decisions.

16. International benchmarking of the Irish pig industry

A high level of technical efficiency will, not alone, help to minimize production costs per kg of carcass but will also maximize profits by optimizing the amount of pig meat produced per sow per year. The survival and profitability of the pig production sector in Ireland is very much dependent on how cost competitive it is in comparison to other countries and in particular to major EU pig meat exporting countries such as Denmark and the Netherlands. In the longer term, any freeing up of world trade involving pig meat will mean that Irish producers will have to compete with low cost producers such as Brazil.

Information is available on how technical efficiency in Ireland compares with that in certain other EU countries. Ireland is one of 10 countries which now participate in an annual comparison of production costs titled InterPig.

The results for 2005 are used for the purpose of this analysis (Table 16.1).

Table 16.1. Key technical efficiency parameters in selected European countries – 2005

Country	*No. Pigs per Sow per Year*	*Average Live Weight at sale kg*	*Weaning to Slaughter ADG g*	*FCE*	*Sample size Sows*
Austria	20.1	118.0	640	2.65	150 herds 50-100 sows Integ 70-200 sows br 400-1000 finishers
Belgium	20.9	114.6	540	2.64	
Denmark	24.3	105.0	692	2.53	550 farms Ave 500 sows
France	22.5	114.6	670	2.69	40% of herd for production 500 herds costings
Germany	20.0	119.0	638	2.73	C 1000 herds ave 130 sows 750 finishers
Great Britain	19.4	96.9	589	2.40	200 herds c 205 sows
Ireland	21.9	98.6	609	2.45	c50,000 sows
Italy	19.7	163	571	4.20	35000 sows
Netherlands	23.4	113.8	633	2.48	155 sows and 10% finishers Ave 266 sows 1100 finishers
Sweden	22.0	114.8	716	2.60	10-15% sows 20-30000

Source: InterPig 2006

The data used in this comparison is obtained from recording systems in the participating countries and this data has been analysed using an agreed standard format. The accuracy of the comparison depends on how representative the data is from the participating countries. The data for Ireland represents about 30% of the national herd and compares well with the sample size in other countries in the study

It is likely that herds which participate in herd recording and benchmarking systems are more efficient than the average of all herds in each country. Good record keeping is associated with a high level of technical efficiency.

The low growth rate in Belgium is likely to be due to the widespread use of Pietrain stock. This should be of concern in Ireland where Pietrain sires came into favour because of perceived resistance to Post weaning Multi systemic Wasting Syndrome (PMWS).

16.1. Sow Productivity

The number of pigs produced per sow per year places Ireland (21.9) behind Denmark (24.3), the Netherlands (23.4) and France (22.5) and similar to Sweden (22.0). Two of the key components of sow productivity are:

- Farrowing Index.: The Number of Litters Produced per Sow per Year

- Number of Pigs Born Alive per Litter

In Table 16.2 the countries are ranked based on the number of pigs born alive per sow per year.

Table 16.2. Farrowing Index, No. Born Alive per Litter and No. Born Alive per Sow per Year in selected European Countries 2005

Country	*Litters per Sow per Year*	*No. Born Alive per Litter*	*No. Born Alive per Sow per Year*
Denmark	2.27	13.22	30.0
France	2.24	12.6	28.2
Netherlands	2.33	12.0	28.0
Sweden	2.22	12.1	26.9
Ireland	2.28	11.19	25.5
Germany	2.26	11.1	25.1
Austria	2.24	10.9	24.4
Belgium	2.28	10.72	24.4
Great Britain	2.22	10.87	24.1
Italy	2.17	10.6	23.0

Source: InterPig 2006

The differences between countries in **number born alive per sow per year** are substantially less than the differences in **number born alive per litter**. The farrowing index for Ireland (2.28) is second only to the Netherlands (2.33) but **no. born alive per litter** falls far short of Denmark (13.22), France (12.6), Sweden (12.1) and the Netherlands (12.0).

There is an increase in piglet losses associated with an increase in **litter size**. Nevertheless, the main factor limiting sow productivity in Ireland is the relatively low number born alive per litter.

Number born alive per litter has increased in Ireland over the last decade but not to the same extent as some other countries (Table 16.3). Even the top 25% in Ireland have not matched the average improvements in Denmark and France.

Table 16.3: Changes in Number Born Alive per Litter in selected countries (1995 /2005)

Country	*Source*	*1995*	*2005*	*Change*
Ireland	PigSys	10.8	11.19	+0.39
Ireland Top 25%	PigSys	11.36	11.66	+0.30
Denmark	NCPP	11.08	13.22	+2.13
France	IFIP	11.00	12.9	+1.29

In the Netherlands number born alive per litter has increased from 11.1 in 1998 to 12.0 in 2005 – an increase of about 0.15 pigs per year.

Factors to be considered in identifying reasons for low Born Alive per Litter on Irish pig units include:

- Prolificacy of the breeding stock available
- Effectiveness and implementation of breeding programmes on commercial units
- Sow feeding and, in particular, lactation feeding
- Gilt integration and management
- Loss of skilled operatives especially to the construction industry

16.2. Slaughter Weights

In most of the European countries involved in InterPig pigs are slaughtered at about 115kg live. However, in Ireland (and also in Great Britain) slaughter weights are, on average, less than 100kg live. In both countries male pigs are reared as entire males whereas in all other countries castration is standard practice. Concerns about the possible development of boar taint in entire males taken to heavier weights have been a deterrent to the adoption of higher average slaughter weights in Ireland. Nevertheless, there has been a significant increase in slaughter weights in Ireland in the last decade (Table 16.4).

Table 16.4: Average slaughter weights in Ireland 1995-2006

Year	*Average Slaughter Weight kg (dead)*
1995	65.5
1996	66.2
1997	67.5
1998	67.7
1999	68.4
2000	68.1
2001	69.6
2002	70.8
2003	71.3
2004	73.0
2005	75.0
2006	74.0

Source: PigSys Report 2005

Pig slaughter weights have been increase by 9.5 kg in the course of 10 years. This increase has occurred in response to changes in the market requirements for pig meat. The potential for further increase in weights is likely to be limited with entire males and castration is unlikely to be a viable alternative considering

the negative impact on production efficiency and the associated pig welfare considerations.

The legal floor-space requirement for growing pigs increases from 0.65m^2 in the interval 65 to 110kg to 1.0m^2 above 110kg which corresponds to a carcass weight of c. 84kg. Two-stage finishing housing will be required to stay in compliance at very heavy weights.

16.3. Growth Rates

The average growth rate figures from weaning to slaughter for the different countries are not readily comparable due to the differences in slaughter weight. To achieve a modest 650 g per day from weaning to 115 kg finisher pigs on Irish units would have to grow at 1040 g per day from 98.6 to 115 kg. Even at 650 g per day adjusted to 115 kg sale weight growth rates would be well below those reported for Sweden (716), Denmark (692) or France (690).

Growth rates on Irish units are low not just because of the low slaughter weights. A key component of high growth rates is a high ***daily feed intake***. Feed restriction will reduce growth rates. While deliberate feed restriction is unlikely there are numerous factors that may result in reduced feed intakes.

These include:

- Genetics
- Feeder/trough design
- Overcrowding
- High environmental temperatures
- High water to meal ratios
- Disease
- Feed palatability

16.4. Feed Conversion Efficiency

Again the comparison is complicated by the differences in slaughter weight. When allowances are made for these differences the efficiency of feed utilization in Irish pig herds is broadly similar to that recorded in the other countries except for Italy for which the data relates to Parma ham production based on very high slaughter weights.

A preliminary examination of the energy specification of the diets used in the different countries suggests that the average **Metabolisable Energy** content of diets fed in Ireland (13.36) is higher than in other countries except Denmark (13.97) and the Netherlands (13.64) (Table 16.5).

Table 16.5. Efficiency of feed utilization in selected European countries

Country	*FCE Weaning to Sale*	*Average ME content of diets MJ per kg*	*MJ ME per kg Liveweight Gain*
Austria	2.65	12.26	32.5
Belgium	2.64	n.a.	n.a.
Denmark	2.53	13.97	35.3
France	2.69	12.86	34.6
Germany	2.73	13.07	35.7
Great Britain	2.40	13.11	31.5
Ireland	2.45	13.36	32.7
Italy	4.20	12.73	53.5
Netherlands	2.48	13.64	33.8
Sweden	2.60	12.65	32.9

Source: InterPig 2006

The efficiency of feed utilization in Ireland and Britain should be significantly better than other countries due not alone to the lower slaughter weights but also to the use of entire male pigs rather than castrates.

16.5. Production Costs

Feed is the single largest cost item in pig production and in Ireland feed represents about 65% of total production costs.

Feed Cost per Kg Dead

The average composite price of purchased feed on Irish pig farms in 2006 was €214 per tonne. (Table 16.6; Teagasc Pig Development Unit: National Monitoring of Prices and Margins in Pig Production). The latest composite feed price (November 2007) is €289 per tonne.

Table 16.6: Average feed price per tonne for purchased feed on Irish pig farms - 2006

Diet	*Quantity Fed per Pig kg*	*Average Price per Tonne €*	*Feed Cost per Pig €*
Dry Sow meal	35.9	183	6.57
Lactating Sow meal	19.3	205	3.96
Creep pellets	4.2	798	3.19
Link pellets	7.2	496	3.57
Weaner pellets	34.1	253	8.63
Finisher meal	179.7	190	34.14
Total	***280.8***		***60.06***
Average Composite		***214***	

Source: PigSys

The data on feed usage is from Pigsys for 2005 when the average weight at sale was 75 kg dead at 75.7% kill out or a live weight of 98 kg. The feed cost per kg dead weight was 83.0c in 2006. At current feed prices the feed cost per kg dead weight is about 110.5c/kg.

16.6. International Feed Cost Comparison

The ongoing InterPig project provides a comparison of production costs, including feed costs, in the participant countries (Table 16.7).

Table 16.7. Feed Prices and Feed Cost per kg Dead Weight in selected European countries (2005).

Country	***Average Feed price per tonne €***	***Feed Cost per kg Dead Weight c***
Netherlands	166.67	59.1
Sweden	152.77	59.6
Germany	157.17	62.2
France	165.41	65.5
Denmark	173.55	66.0
Belgium	181.52	66.7
Austria	178.28	66.8
Great Britain	185..62	71.5
Ireland	**213.87**	**79.9**
Italy	203.92	117.7
Average (Excl. Italy)	***175***	***66.4***

Source: InterPig 2006

For most of the participant countries (seven out of ten) the feed cost per kg dead weight was less than 67c. Excluding Italy, for which the data refer to the special Parma ham production. The feed cost per kg is highest in Ireland and is more than 11c per higher than for most countries. The Irish cost (79.9c) is significantly higher than Great Britain (71.5c).

Most of these differences relate to the differences in the average feed price per tonne (Table 16.8). Pig feed prices in Ireland for all compound diets are considerably higher than in other countries. For a discussion on feed prices in Ireland see section 19.

The average feed price per tonne in France in 2005 was €165.41. In September 2006 two different feed suppliers quoted prices that gave a composite price of about €160 per tonne (Table 16.9). In this exercise the total feed from weaning to slaughter (7-115 kg) amounts to 274 kg or a feed efficiency of 2.54. This is significantly better than the 2.69 reported in InterPig 2005.

Table 16.8: Average price for different feeds in selected European countries

Diet	***Sow***	***Rearer***	***Finisher***
Average €	170.41	266.85	164.56
Lowest €	153.94	241.13	142.87
Highest €	189.00	326.23	187.50
Ireland €	187.00	326.23	187.00
Ireland vs Average	***+16.59***	***+59.38***	***+22.44***

Source: Interpig 2006.

Table 16.9: Pig feed prices in France September 2006

Diet	***Feed per pig, kg***	***Coop de Bruins***	***Cooperyl Hunaudaye***
First stage	5	309.04	499.50
Second stage	31	196.80	200.50
Grower	95	151.30	150.50
Finisher	143	145.30	143.50
Gestation	33	154.50	151.50
Lactation	21	174.00	166.50
Total	328		
Composite		***158.92***	***160.99***

Total feed from weaning to slaughter (7-115 kg) in this exercise amounts to 274 kg or a feed efficiency of 2.54. This is significantly better than the 2.69 reported in InterPig 2005.

These feed price differences are due in part to differences in the quantity and proportions of the different diets fed.

Weaner Feeding: In Ireland considerably higher quantities of expensive diets are fed (Table 16.10). As an example pigs remain on relatively expensive weaner feed to a heavier weight when a finisher diet might be expected to support similar growth rate and FCE.

Table 16.10. Weaner feed costs in Ireland and France compared

	Ireland	***France***
Feed per weaner, kg	53.9	44
Average feed price per tonne, €[1]	329	247
Weaner transfer weight, kg	36.3	32.1
Weaning weight, kg	6.6	7.5
Weaner FCE	1.81	1.79
Feed cost per Weaner, €	***17.73***	***10.87***

[1] *Weighted average of starter, link and weaner feed*

1 The usage of Creep/Link or First Stage diets in France is considerably lower at 6.8kg per pig than in Ireland (11.3kg per pig) as is the weighted average price of creep/link (€560 v €593/tonne)

2 Pigs in Ireland are fed weaner diets until 36.3 kg, on average which is 4.2 kg heavier than in France

3 There are considerable differences in the cost of the diets fed between the two countries. . Nevertheless FCE from weaning to transfer is similar in the two countries.

Finisher Feeding: Pig slaughter weights in France and other countries (except Britain) are higher than in Ireland. Consequently, finisher feed is a smaller proportion of the feed used from weaning in Ireland. Finisher feed is significantly less expensive than the diets fed to weaners. In France as in other countries the use of two diets from about 30kg until slaughter enables overall cost to be reduced as the second finisher diet is about €6 per tonne less expensive than the first (Table 16.9).

Aside from the differences in the quantity and proportion of the different diets fed Irish prices for particular feeds are considerably higher than those in other countries (Table 15.8).

Application of French proportions of the several diets to Irish pigs combined with the French slaughter weight and a lower cost second stage finisher would result in a composite feed price of about €195, significantly lower than the €214 recorded by PIGSYS (Table 16.7)

Common costs of production
These are costs of production that are incurred on the vast majority if not all units. Included are:

- Labour and management
- Healthcare
- Heat/power/light
- Repairs
- Transport
- Stock depreciation
- Manure handling and environmental compliance
- Insurance
- AI
- Office and phone
- Miscellaneous

Ireland compares very favourably with the other participant countries in the Interpig project (Table 16.11).

Table 16.11. Total costs and Common non-feed costs of production for pigmeat in selected EU countries

Country	*Total Cost per kg dead c*	*Of which Common Costs per kg dead c*	*Of which Labour Cost per kg dead c*
Ireland	137.4	34.2	12.9
Belgium	125.3	34.3	14.5
Italy	185.8	39.0	17.2
France	132.3	40.5	17.7
Denmark	133.9	40.7	13.6
Netherlands	125.3	42.0	15.4
Sweden	140.9	43.9	21.6
Germany	144.9	50.2	18.6
Britain	152.6	56.4	17.9
Austria	151.0	57.7	20.7

Source: InterPig 2005

Labour is by far the most important of the Common Costs. The larger unit size in Ireland produces efficiencies which help to reduce labour costs.

Major differences between countries arise in the expenditure on Repairs and contribute to the variation in Common Costs.

Herd-specific costs of production
These are mainly due to:

- Building depreciation
- Interest

17. Government policy initiatives

Government initiatives can influence the competitiveness of an industry by facilitation of change, development of infrastructure, grant-aid, technical support, tax concessions and positively or negatively by regulation.

17.1. Rationalisation of processing

An initiative by the Industrial Development Authority (IDA) in the mid-1980s resulted in upgrading of a small number of pigmeat plants and the closure of some others. This modernisation resulted in improved product quality and more efficient processing contributing to the increase in the national pig output in the following years. Further rationalisation of pigmeat processing was envisaged by a Department of Agriculture policy think tanks (Agri Vision 2010, 2000; Agri Vision 2015, 2004). However the past ten years have seen a number of smaller slaughter plants compete successfully with the plants upgraded in the 1980s. These smaller plants now account for about 32% of the weekly kill.

17.2. Taxation policy

The application of manufacturing tax rates to the production of animal feed on the farm was a major driver of the adoption of computerised wet feed systems in the industry with a view to home compounding of feed.

17.3. Business Expansion Scheme (BES)

Many pig producers availed of BES funding which allowed investors in particular approved projects (including PAYE taxpayers) to reduce their tax payments. Feed manufacture was one such activity, which benefited from this scheme. Construction of buildings was another.

18. Financing pig production

18.1. Structured lending

The current capital investment per sow integrated in buildings and site development can be almost €4,500 (Table 18.1). If borrowed over 10 years at 7% the annual repayments are about €625 per sow or €28 per pig produced (or 38 cent/kg deadweight). Obviously it is not possible to finance a new development totally from borrowings. This makes it impossible for new entrants to pig production to build new units without independent financial resources. Consequently, the vast bulk of expansion, if any, will come from existing units where the additional repayments can also be spread over the original sow herd.

Table 18.1. Breakdown of building cost for a pig unit on a Greenfield site (per 100 sows based on c. 400 sow unit).

Category	No places	Cost per place, €	Total cost, €
Pregnant sow	82.5	850	70,125
Farrowing	22.5	3,000	67,500
Gilts	12	450	5,400
Boar	2	1,000	2,000
Weaner stage 1	185	200	37,000
Weaner stage 2	230	180	41,400
Finisher	550	300	165,000
Site development and services			50,000
Total			438,425

Such investment will only occur if the producer is confident that the investment will yield a satisfactory rate of return relative to other opportunities inside or outside the farm gate. The low rate of return will inhibit any movement of pig units from grassland to tillage areas.

In addition to the capital investment in buildings and equipment provision must be made for working capital. This will be of the order of €500 per sow at current feed prices and will depend on the amount of feed credit availed of.

Even where expansion is not proposed, existing units will require financial investment for repairs and maintenance. Some fittings and fixtures require upgrading or modernising every 10 years or so. These usually include some steelwork, troughs, feeders, slats, insulation, ventilation equipment, feeding systems, pen divisions, heating system etc.

In Canada there has been significant investment in new pig units (breeding and contract finishing) on or next to tillage farms. The pig manure is used to fertilise the land for growing grain which in turn is used to feed the pigs.

A contract finishing unit for 2,000 finishing pigs (upper limit of unit size without a license) would cost about €625,000 to build (including €25,000 for site development and services). Repayments on a 10 year loan at 7% interest would be €43 per pig place, €11 per pig sold or 14 per kg carcass sold.

Finance costs may be reduced by:-

- Negotiating loan terms and interest rates with the lender and shopping around for the best rates.

- Extending the loan repayment period from the traditional 10 year term to 15-20 years. This may be an option for young producers seeking to get established. It may be more acceptable to the financial institution to put the building structure on a 15 to 20 year term while leaving the finance for fittings and fixtures on a 7 to 10 year loan. In some cases this could result in a 25% reduction in the annual payment compared with the normal financial arrangements.

18.2. Attitude of the main banks to investment in pig production

Banks in general are positive about pig production. Current concerns with regards to pig production include the impact of the nitrates regulations on farm profits. A concern with regards to lending money for new development is the cost and time scale for obtaining planning permission.

While banks are aware of the high cost of new developments they tend to focus more on the sale value of a unit, i.e. what value would a unit sell for if it were put on the market. Many pig units have a low re-sale vale due to being located close to the family residence or to other farm enterprises.

Key considerations when financing pig production include:

- Security – many units are on small sites. Having sufficient land/assets as a security against a loan is important. Otherwise the borrower will need sufficient own resources to invest in a proposed development.
- Track Record – the track record of an individual is very important, i.e. their historical ability to repay a loan.
- The "individual" borrower is important, as is his training, qualifications, etc.
- Performance Records – good accurate records for a unit always help a bank to make a decision on whether to finance a loan. These records can also be used in preparing Cashflow projections (for the bank) for a given project.

18.3. Overdraft and cash flow

Excessive reliance on overdraft funding is expensive. It may be an indication of poor overall financial control of the enterprise.

18.4. Feed compounder credit

There is an unhealthy reliance by many producers on long lines of credit from feed manufacturers. This benefits neither side. For the compounder there is the risk of a bad debt and the cost of account administration charges. For the pig producers his scope to negotiate better terms or switch suppliers is greatly reduced. Consequently he may be paying a higher feed price and/or be receiving a feed of lower specification. Since it is assumed that credit charges will not be paid if shown on the invoice, feed manufacturers tend to include the likely credit cost in the quoted feed price. A bad debt must inevitably be paid by the merchant's other customers.

Compounder credit should be used sparingly to allow maximum flexibility in feed purchase.

Feed manufacturers should work closely with producers and their advisers to greatly reduce the amount of indebtedness and ensure the long-term viability of the enterprise. Payment by direct debit should be encourage by transferring part of the savings to the customer in a lower feed price.

19. Staff supply and training

19.1. Sources of staff for the pig industry

Skilled staff who are motivated to deliver a high level of technical performance are essential in pig production. Large, specialised units with skilled, well-trained staff were the drivers of the world class productivity in the industry in the past. The supply of staff from the Athenry Pig course was the foundation on which this productivity was achieved.

The availability of better paid employment outside of agriculture and especially for semiskilled labour in construction has resulted in a mass exodus of Irish workers from the pig industry. There is now a high percentage of East European workers in the industry. While many such workers are excellent, lack of experience with pigs and a poor command of English are major problems. The rate of pay for many such workers is low (often little more than the legal minimum wage) resulting in a high turnover rate and resulting low skill levels.

Housing provided for or available to for immigrant workers is often less than ideal which contributes to their speedy exit from the industry.

19.2. Formal college based training

There is no formal training in pig production/husbandry at the present time in either Teagasc or private colleges. Neither is there an option to take a pig production module with the present set of courses. Evidence from Clonakilty college in recent years suggests that a well-organised course taught by a knowledgable teacher would attract students.

19.3. University training

The teaching of a highly acclaimed pig production module at the Faculty of Agriculture in University College Dublin and active post-graduate training programmes in UCD and Teagasc has ensured a steady supply of nutritionists to service the pig industry and the feed industry in general. However, interest in pig production among unde- and post-graduates appears to be in decline at present.

19.4. Work based training

Teagasc staff have been delivering one-day and half-day training workshops for operatives and supervisory staff. The response has been good and there is a need to develop the concept further to provide accreditation in the form of a formal, internationally recognised qualification for attendees who complete a planned programme.

19.4.1. Operatives

A high proportion of new operatives entering the pig industry are now sourced from the new members states of the EU and other Eastern European countries.

Many workers from the member states tend to move on to better paid employment once they have established themselves in Ireland while those from non-EU states are usually on work-permits and as a result are less mobile. The latter category has declined in recent years

There is an urgent need to deliver training to these operatives if their skill levels and productivity are to be improved. Pig producers can afford to pay skilled staff at a higher rate and provide better living conditions which should reduce staff turnover.

While it is desirable that operatives whose competency in English is poor receive basic training in their native language it would be unrealistic to do so in all cases. More advanced pig production courses can only be delivered in English as a good working knowledge of English is necessary if workers are to assume positions of responsibility.

19.4.2. Managers

The Certificate in Pig Husbandry – a two year course taught from the Athenry college provided a supply of managers and skilled stock persons to the industry from 1969 to 2003. Numbers in the first year of the course peaked at 32. The final intake of 6 was in (2000) and of these 4 graduated in 2003. At the present time there is no college based training programme for pig producers, operatives or managers.

A greater range of training options outside agriculture and the fall from favour of narrow agriculture-only courses in general contributed to the demise of the course. In future managers and supervisors will probably have a formal third level qualification or be recruited from among foreign born workers who have started as stockpersons or operatives.

There will be a need for formal training for supervisory staff. This should include training in:

- pig production technology,
- business management,
- staff management,
- pig welfare,
- staff health and safety,
- environmental management.

19.5. Retention of staff

A high turnover of staff on a pig unit is a waste of training and disruptive to the performance of the unit. While pay rates are a very important factor in job satisfaction the general working environment and relationships with line managers and work colleagues are also important. There is a need for better working conditions, better staff facilities on farms and for owners and

managers to be proactive in retaining staff. Areas such as pension, insurance, days-off, working hours, etc need to be addressed.

Staff facilities on many farms are poor. Improved facilities should include:

- living accommodation (where provided),
- hygiene during work (showers, hand washing, toilets, changing areas, supply of workwear, laundry) and
- basic kitchen (cooking, toaster, kettle, microwave, radio) and eating facilities.

19.6. Occupational health in workers in pig units

Working inside pig units can potentially expose workers to airborne dust, gases and other airborne particles which can have a negative impact on lung function. It is important that levels of these pollutants in the air be minimised by maintaining clean conditions, adequate ventilation, feeding diets with low protein content and feeding systems which reduce dust emission. Noise is a particular hazard especially when sows are being fed.

These issues should be addressed in the unit Health and Safety protocol for the farm and should be enforced. Adequate personal protection equipment should be provided (eye-protection, dust masks, ear protection, boots, clothing).

These are legal requirements and in the event of an accident failure to have complied will have serious legal consequences.

20. Feed supply to pig production

20.1. The Irish feed industry

The Irish Compound Feed Industry processes approximately 3.5 million tonnes of animal feed annually. This figure has increased from about 3.0 million tonnes in the early 1990s with most of the increase being in cattle feed. Compound pig feed manufacture has declined over the past six years to its present level - almost 0.6 million tonne, less than 20% of all commercially manufactured animal feed (Table 20.1).

Intense competition between feed mills and the purchasing power of pig units results in low profit margins for the high volume sow and finisher feeds. There appears to be much higher margins in feeds for younger pigs (starter, link and weaner). Nevertheless, the feed industry is not recognised as very profitable and is not attracting outside investment.

There are fourteen commercial milling companies with capacities in excess of 7,000 tonnes per annum. The annual output ranges from 7,000 to c. 150,000 t/yr (Table 20.2). Most of the mills manufacturing pig feed are in the south of the country.

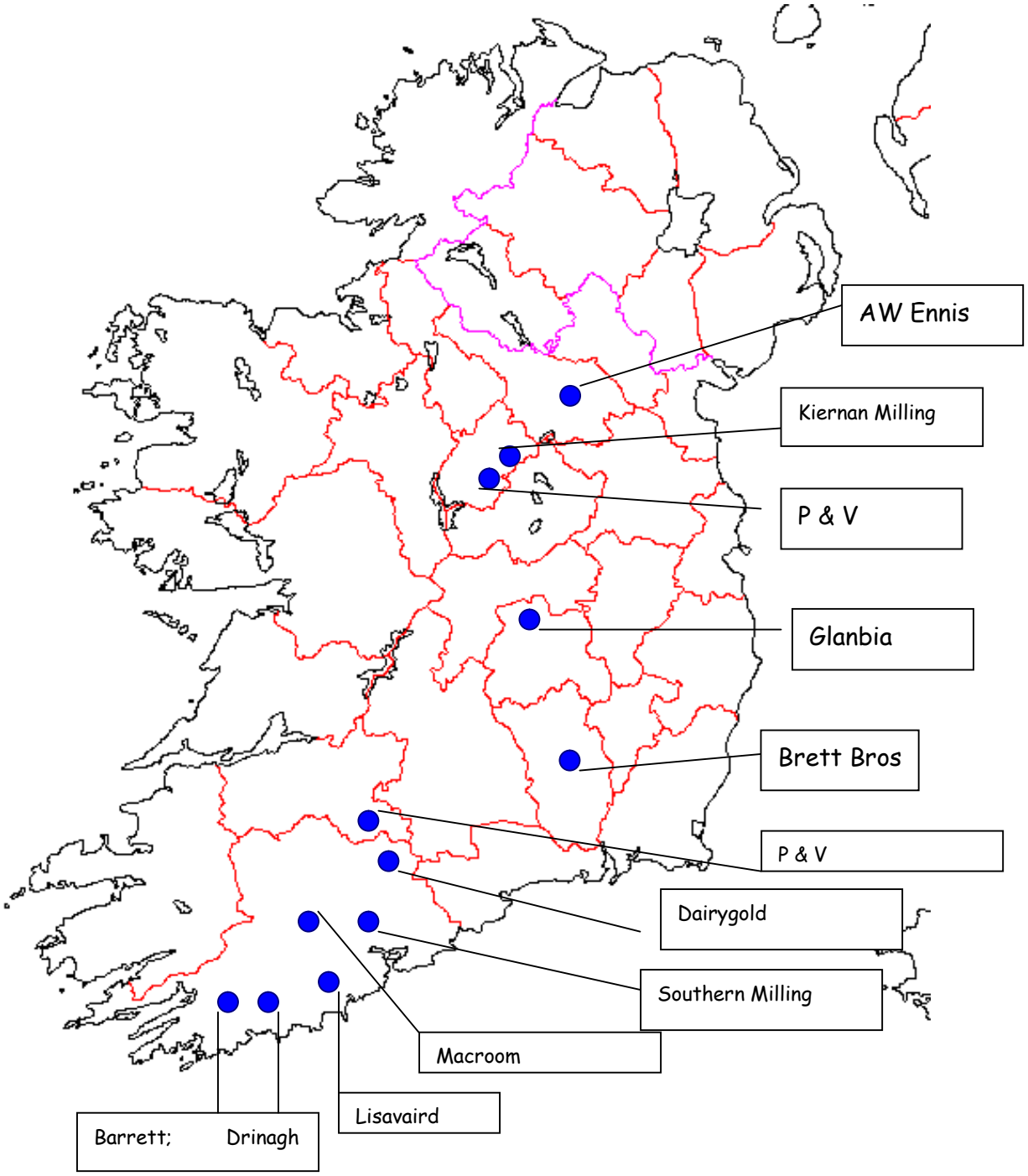

Figure 20.1. Location of principal pig feed manufacturing plants

Table 20.1 Provender Milling Republic of Ireland 2001 -2006

	2001	2002	2003	2004	2005	2006
Cattle	1,962,856	2,144,026	2,100,853	1,965,213	1,986,957	2,338,074
Pig	735,980	747,978	687,391	629,918	624,667	610,314
Poultry	478,724	492,686	485,150	488,051	490,697	453,571
Sheep	205,337	216,065	205,931	207,924	194,460	205,966
Horses	72,096	84,373	87,046	89,537	87,988	97,812
Pets	12,605	12,509	44,694	45,741	40,156	43585
Others	22,593	24,594	22,330	17,501	21,490	24085
Balancers	21,039			21,637		18,628
Minerals/Vitamins	54,084			61,635		124,920
Milk Replacers	9,255			8260		8412
Total	**3,492,192**	**3,724,233**	**3,635,398**	**3,445,889**	**3,448,420**	**3,928,059**

New EU Veterinary legislation is having profound effects on the future direction of pig feed manufacture in Ireland. Single species feed manufacture and certainly separate lines for ruminant and mono-gastric feeds is the order of the day.

Restrictions on the use of medication in feeds will become even more strict in future. The manufacture of special blends with medication included is a very great risk for feed companies and the true cost to the mill in downtime, cleaning and risk of cross contamination is seldom passed on to customers.

Table 20.2 Annual output of commercial feed mills

	Output in tonnes			
Mill annual output	Under 10,000	10,000 to 30,000	30,000 to 100,000	Over 100,000
Number of Mills	3	3	5	3

20.2. On-farm feed manufacture

The total feed requirement of the Irish pig industry is at least 925,000 tonnes. This is based on pigmeat production of 21 pigs per sow from 155,000 sows to a liveweight at slaughter and a liveweight feed conversion ratio from weaning to slaughter of 2.46.

On-farm compounding has increased by 134,000 tonnes over the past six years, a 73% rise. Home compounded pig feed stands at about 320,000 tonne annually, almost 35% of pig feed manufactured in the Republic (Table 20.3). This estimate is the difference between compound feed production and the estimated annual requirement as shown below.

Table 20.3 Home milling versus Provender milling

	2001	2002	2003	2004	2005	2006
Pig feed Provender milling	735,980	747,978	687,391	629,918	624,667	594,000
Pig feed home milling	183,995	213,708	229,130	257,319	268,097	318,186
Total feed	**919,975**	**961,686**	**916,521**	**887,237**	**892,764**	**912,186**
Percentage home milling	20%	22%	25%	29%	30%	35%
Percentage provender millers	80%	78%	75%	71%	70%	65%
Dairy by-product diets	22,079	22,439	20,622	18,898	18,740	17,820
Dairy by-product fed	3,312	3,366	3,093	2,835	2,811	2,673
Other by-products fed	3,312	3,366	3,093	2,835	2,811	2,673
All feed to pigs	926,599	968,418	922,708	892,907	898,386	917,532
Sow population					160,000	155,000
Sow output (pigs sold)					21.9	21.9
Slaughter weight (kg live)					97	99
Feed efficiency per kilo live					2.64	2.73

Units mixing their own feed tend to be larger than those purchasing feed at c. 700 sows. Estimates of the amount of home produced feed vary due to differences in categorisation of some units.

The rise in home mixing is due partly to an increase in the number of farms home milling and partly to an expansion in herd size of those home milling. The advent of computerized wet feeding on farms enabled pig farmers the option to grind straight ingredients and to proportion and mix these.

Home mixing of pig feed usually involves the metering of cereals, protein feed and other ingredients into the mixing tank of the liquid feed system. These systems are usually highly automated and controlled by computer. The water : feed ratio used is usually higher than that needed by the pigs for health and growth resulting in a higher than necessary volume of manure.

Very few home mixing producers mix feed in a dry form for feeding dry as meal.

The development of home-compounding on larger pig units in Ireland has been driven largely by the advantages from availing of manufacturing tax rates.

Table 20.4 Home milling in Republic of Ireland

	Herd size [Sows integrated]						
Scale	200 - 499	500 – 749	750 – 999	1000 - 1499	1500 - 1999	2000 – 2499	**Total units**
Sow herds	32	16	5	12	2	5	**72**
							Total sows
Average herd size	**700**						**50,335**

Source: Teagasc survey of units home mixing

20.3. Principal feed ingredients and supply balance

The main feed ingredients used by feed manufacturers and by home-compounders are barley, wheat and soya. Lesser used ingredients include maize, sorghum, rapeseed meal, maize gluten, wheat pollard, sugar beet pulp, milk by-products. It is normal practice to supplement feeds with a full range of minerals and vitamins. Phytase is widely used to improve digestibility of phosphorus in feeds of plant origin and so reduce the need for supplementation with mineral phosphorus.

The net home-grown cereal tonnage available for animal feed manufacture in the Republic of Ireland stands at 2.5 million tonnes (Table 20.5). Barley tonnage hovers around 1 million and wheat around 0.8 million tonnes. On a national basis pig diets require approximately 700,000 tonne of wheat and barley for manufacture, split almost evenly between the two. This usage represents almost fifty percent of all home grown wheat and thirty percent of home grown barley. So although pig feed represents a lesser consumer of manufactured feed ingredients, it requires almost 40% of all cereals grown on the island and therefore competitive pig and poultry production sectors in Ireland are essential for the success of the tillage sector.

Ireland is a net importer of cereals being about 80% self sufficient in 2000-2001 (Eurostat – Agriculture Statistical Yearbook 2001, Table 2.14) in contrast to Denmark, France, Germany and the UK which are over 100% self-sufficient (119%, 200%, 124% and 113% respectively). The deficit is greatest in the case of wheat where home production is under 70% of market requirements while barley production is in slight surplus (CSO)

While fish meal and plasma protein are permitted to be used in pig feed the requirements of the permitting system act as a deterrent.

Crystalline amino acids are widely used in pig feeds and allow the requirement of the pig for essential amino acids to be met with a lower concentration of dietary crude protein. Two benefits arise: (1) there is more efficient use of feed energy i.e. the diet has a higher Net Energy (NE) value as less energy is wasted in the deamination and excretion of the excess protein and (2) the excretion of nitrogen in manure is reduced and less land should be required for utilisation of the manure.

The crystalline amino acids in widespread use are lysine, methionine and threonine with tryptophan used to a limited extent. Other amino acids which are expected to become available at economic prices in the medium term are valine, isoleucine and leucine.

Table 20.5. Cereal supply to the Irish Feed Industry (1,000 tonnes)

	Year	2000	2001	2002	2003	2004	2005	2006
Total home grown		2,174	2,165	1,964	2,147	2,501	1,934	
Wheat		**737**	**769**	**867**	**794**	**1,019**	**798**	
	Winter	582	489	704	527	751	575	
	Spring	155	280	164	267	269	223	
Barley		**1,310**	**1,277**	**963**	**1,198**	**1,327**	**1,025**	
	Winter	203	157	153	153	168	122	
	Spring	1,107	1,121	810	1,045	1,159	903	
Imports								
	Wheat	630	575	769	681	721		
	Barley	34	64	116	110	43		
Exports								
	Wheat	219	177	175	199	309		
	Barley	219	215	88	102	77		
Food use	Wheat	358	385	370	364	348		
Net cereal for feed		**2,042**	**2,027**	**2,216**	**2,273**	**2,531**		

20.4. Feed costs in Ireland

Feed prices in Ireland tend to be high in comparison with some other EU countries. The high level of ingredient imports means that ingredient prices are determined by the cost of ingredients abroad plus the cost of shipping inwards.

During the second half of 2006, global cereal prices have increased steeply – driven by the demand for corn from the US bioethanol industry and by the effect of the drought on Australian wheat production. The demand from the bioethanol industry is likely to continue for the next several years and while increased prices will stimulate higher acreages the large number of bioethanol plants in production or being built in the US and Canada and the relative profitability of bioethanol will keep feed ingredient prices high.

An unpublished analysis of feed costs in Ireland in 2002 identified a number of factors such as the high proportion of imported ingredients, distribution costs (partly due to the low density of pigs and mills), high mill sales and administration costs, credit and the seasonal nature of compound feed production. Distribution costs are a particular problem in Ireland with the low density of mills compared e.g. with Brittany (Best, 2006).

The feed milling industry in Ireland has an unfavourable cost structure due to the small size of individual mills, the dispersed nature of production and delivery and the seasonal nature of production. In France there are 66 mills each with

an annual output of 100,000 tonnes per year or more representing over 78% of national output. In France poultry and pig feed tonnages accounted for 42% and 30% respectively of total tonnage in 2005 (ITIF, 2006). In the UK pig feed accounts for about 18% of compound feed production and poultry a further 28% (figures for October 2005 to September 2006DEFRA, 2006b).

In Ireland pig and poultry feed accounted for 18% and 14% respectively indicating significant excess capacity in summer when very little cattle feed is sold. It is inevitable then that mill overheads are carried disproportionately by the pig and poultry sectors. In Ireland only two mills specialise in pig feed or pig and poultry feed.

There is little reliable published information on feed manufacturing costs in Ireland but anecdotal evidence suggests that contract milling costs (over and above ingredient costs) in Ireland are high relative to e.g. US and Canada.

There is a need for feed industry costs to be benchmarked both internally and against best practice internationally.

Forward purchase of feed ingredients is used by feed manufacturers to lessen the impact of sudden rises. Pig producers who manufacture feed on farm do likewise. Forward buying of compound feed by pig producers is considered only when ingredients have recently risen steeply as at present (late 2007). "It is impossible to eliminate risk entirely. During a period of low prices it would probably be a sensible decision to buy forward for a year. When prices are high, as at present, short term contracts might be the right decision to make. But this assumes that next year's harvest will be better than this year's harvest…." (Fowler, 2006b).

The widespread adoption of GM crops in the US and also in South America has led to a relative shortage of and high prices for non-GM ingredients. The slowness of EU procedures for authorisation for importation of grains from new GM varieties (after safety assessment has been completed by the European Food Safety Authority) is lagging far behind that in the US and other countries. This has resulted in a ban on importation of product from GM varieties (in particular maize grain and maize by-products) which are being grown commercially in the US. The strict zero tolerance policy for the low-level presence of EU non-approved in shipments from the US is a major concern.

This has been a major contributor to high feed prices in Ireland in 2007 and could potentially result in a scarcity of soyabean meal in 2008 when some newly authorised varieties are grown in the US and South America. The difficulty is recognised in the EU Commission and a recent report states that the Atlantic countries of the EU including Ireland are most affected since they tend to import large tonnages of maize by-products from the US (DG AGRI, 2007).

There is an urgent need to speed up the process of authorisation once the EFSA assessment has been completed.

20.5. Food industry by products

By-products contribute only a small percentage of the feed requirement of the Irish pig industry. This is in contrast to the contribution of by-products in other EU countries such as the UK, Netherland etc. The by-products most widely used in Ireland are:

- Yeast
- Whey
- Milk, etc.,
- Pot ale syrup
- Rice water
- Pizza base
- Fruit

In the past whey and other milk products contributed up to 12% of the annual feed requirement of the Irish pig industry. Modern processing techniques can recover lactose and some proteins from whey so that the nutrient content of whey currently available is much less than in the past.

Products such as milk by-products, spent yeast, pizza bases, bakery waste and chocolate can be recycled as pig feed supplying valuable nutrients and will support good pig performance provided the complete diet is carefully formulated. However, it is essential that the by-product be fresh, free from harmful substances, maintain composition in storage and be consistent in composition and quality. Consumption of by-products by pigs is of benefit to the environment compared with disposal by means such as landfill, landspreading, incineration or discharge to waste treatment plants.

20.6. Use of performance enhancers

A number of products (including some antibacterials and copper sulphate) have been used in the past as digestive enhancers and under the right conditions their use resulted in small but economical improvements in pig growth rate and feed conversion efficiency. The use of antibacterials as digestive enhancers has now been phased out but these have been replaced by:

- feed acids,
- acid salts,
- organic trace minerals,
- essential oils,
- flavours and botanicals
- enzymes

Most have little supporting efficacy data. Pig producers need to be much more critical of ingredients and additives whose claims are not supported by reliable

research reports. Inclusion of such unproven products in feeds adds unnecessary cost.

20.7. Regulation of feed quality

Regulation of feed quality involves the Department of Agriculture and Food who monitor imports of ingredients and manufactured feed for compliance with (1) EU legislation, (2) Irish legislation and (3) declared ingredient or ingredient category and (4) nutrient content.

In the case of compound feedingstuffs other than those intended for pets, the exact percentages by weight of feed materials used in the feedingstuff must be made available to the customer on request (SI 237 of 2003).

A comprehensive reference guide to feed legislation in Ireland may be found at:

http://www.agriculture.gov.ie/index.jsp?file=feedingstuffs/index.xml

The constituent declarations required by law are of little practical value in comparing or assessing pig feeds. Feed labels appear to be more about regulation than customer information. Allowing the use of a product data sheet to contain all the regulatory information would keep the label free for essential nutritional information.

Dietary energy content which is probably the most important single measure of feed quality need not be declared mainly because it would be impossible or impractical to verify any claims.

With the emphasis on amino acid balance and amino acid digestibility it is desirable that levels (total and digestible) as calculated from the ingredient composition be declared. This information might not be verifiable by analysis but could be confirmed from the mill records of ingredient analysis and feed manufacture.

Since most pig feed is now delivered in bulk provision of additional information on diet composition could be by electronic means greatly reducing the cost of label printing and postage.

Formulation of feed may be on the basis of digestible energy (DE), metabolisable, energy (ME) or net energy (NE) and total or standardised ileal digestible (SID) amino acids. There is some advantage in moving to the more precise NE and SID systems.

The composition of premixes which supply vitamins, minerals, amino acids and possibly other ingredients such as enzymes needs to be much more comprehensively described than at present.

The ban on the use of meat and bone meal in pig feeds in the mid 1990s removed a cheap source of protein from pig feeding and at the same time resulted in increased disposal costs for offal. Recently there appear to be tentative moves at EU level to permit the use of meat and bone meal from poultry in pig feeding and meat and bone meal from pigs in poultry diets (EESC, 2007). The European Food Safety Authority in a scientific opinion concluded "that the risk of transmitting BSE to pigs utilizing poultry Processed Animal Proteins and vice versa is negligible. Consequently in this scenario any increase in the exposure risk of BSE to humans would be negligible" (EFSA, 2007).

21. Research and development

21.1. Bodies involved

Teagasc is the body charged by the government with responsibility for research and development in pig production. The Teagasc pig service offers research, advice and training within a unified management unit.

The Teagasc pig production research programme covers a range of areas including nutrition and management, animal welfare, manure management, meat quality, food safety and economics. The programme is closely linked with the research programmes in Irish and overseas universities through location and supervision of graduate students and jointly funded projects.

There is little research activity in pigmeat in either Teagasc or the universities. In view of the importance of pigmeat to the agricultural economy, in per capita consumption and food exports, there is an urgent need for an ongoing programme of research into pigmeat quality and technology. This would at the very least provide a skills base for industry development and problem solving.

Economic aspects of pig and pigmeat production and marketing are also ignored in the research portfolios of the various institutions and this probably reflects the industry's lack of political clout.

21.2. Funding R & D in Ireland

The main source of funding for pig production R &D is the government through the Grant-in-Aid to Teagasc and the universities.

Other sources of funding include:

- Department of Agriculture Research Stimulus Fund (RSF),
- Department of Agriculture Food Industry Research Measure Fund (FIRM)
- Department of Agriculture National Development Programme
- EU Framework programmes
- Customer fees (mainly for advisory contracts)

- Farm activity income
- Contract research

21.3. Pig Research Levy

Since 1990 a Pig Research Levy has been in operation in Ireland. This was negotiated by Teagasc with the Irish Farmers Association (IFA) and Irish association of Pigmeat Processors (IAPP). The levy was set at 3 old pence (3.81 Euro cent) per pig from the producer and 3 old pence (3.81 Euro cent) from the meat processor. The levy was intended to support research into pig production amd pigmeat issues. Collection was not extended to the non-IAPP plants and these now account for about 30% of the weekly kill or to live exports. The levy collection is administered by the IAPP and controlled by a Research Levy Committee of IFA and IAPP.

The potential income from the research levy (at the original rate) if applied to all slaughterings in licensed plants (2.6 million pigs per year) is about €198,000 per year but producer spending on pig production and pigmeat research falls well short of this figure. .

The level of collection and activities supported by the levy remain unclear to producers and it is not known what proportion is devoted to research. About 1995, payment of the levy was made a condition of purchase of pigs by IAPP but it is not clear if this policy was implemented.

Contributing pig producers should receive an annual statement of account showing (1) the amount collected, (2) a list of projects supported, (3) the amounts paid in respect of each and (4) the current balance in the fund.

If adjusted for inflation in the period from 1990 to 2007 (+ 62%) the levy charge would be 6.2 Euro cent per pig from both producer and processor and give a total income of €322,000 per year. In the absence of significant imput by the pig industry into near market research it is inevitable that staff resources will be deployed to other enterprises or towards research areas likely to attract EU, national or commercial funding

The operation of producer levies/charges in a number of countries is discussed in section 21.4 below. If the research levy in Ireland were paid at a level comparable to those countries **(25 Euro cent per pig)** it could finance both an expanded research programme and advisory/training service that could be delivered without further payment by the producer. Total income to the fund would be €900,000

21.4. Funding R & D abroad

Governments in many countries are tending to reduce support for near-market or applied research and development. This has resulted in producer funding of

these activities becoming much more important. Amounts invested and the activities which are supported vary from country to country and it is difficult to find a common thread. Table 21.1 shows the producer contribution and activities supported in a number of countries. Funding can be from compulsory or voluntary levies and activities supported include marketing, sales promotion, disease control, R& D, carcass grading etc.

Voluntary levies tend in general to have a reduced collection rate since individual producers may opt out of paying but still benefit from the activity of the fund.

Table 21.1. Producer funding of ex-farm activities in selected countries

	Payment	Agency and activities supported
Australia	1.54	Australia Pork Ltd – Residue monitoring; promotion; R&D; staff training
New Zealand	2.40	New Zealand Pork Industry Board – promotion; herd health; R&D; industry representation
Denmark	1.34	Danish Pig Marketing and promotion; breeding; advisory; R&D
UK	1.60	British Pig (BPEX) – promotion; R&D
Canada	0.49 (SK); 0.66 (AB)	Prairie Swine Centre and provincial pork councils – R&D; technology transfer; promotion
USA	0.4% of sale price	Pork Industry Board – promotion; consumer information; R&D; education; state pork boards

UK

The Meat and Livestock Commission (MLC) is a Non Departmental Public Body, funded through the collection of levies on sheep, pigs and cattle slaughtered for human consumption or exported live supplemented by EU and Government grants and from money earned from its own commercial operations.

Over recent years the MLC has created a new federal structure. Responsibility for the setting and delivering of strategy for the deployment of levy income has been devolved to four bodies of which the British Pig Executive (BPEX) is one. The objective of BPEX is to determine the MLC's Pig Strategy and to ensure that GB pig levy payers' money is efficiently deployed in line with this strategy. BPEX operates with maximum autonomy, subject to MLC's statutory responsibilities.

The levy paid on pigs totals £1.05 (€1.60) per head. This breaks down to 65p (€1.00) promotional levy, paid by the producer and 40p (€0.60) general levy which is split equally between the producer and slaughterer.

Source: http://www.bpex.org/; http://www.mlc.org.uk/

New Zealand

The New Zealand Pork Industry Board operates (under the New Zealand Pork Industry Board Act 1997) in the interests of pig farmers to help attain the best returns for New Zealand pigs and pork products. The board has five key strategic areas of focus. These are:

- Supply Chain Links - Secure a strong relationship between the Board and other sectors of the supply chain by facilitating information exchange.
- Product Differentiation - Ensure 100% New Zealand pork is the consumers' first choice.
- Biosecurity and Trade - Protect value for the New Zealand pork producer.
- Environmental Sustainability and Animal Welfare - Ensure that pork producers are treated equitably; by maintaining acceptable standards for environmental sustainability and animal welfare practices.
- Research and Innovation - Secure the long-term future of the New Zealand pork industry by facilitating the means of achieving competitive production and innovation throughout the value chain.

Within these five key strategic areas of focus the Board encourages the adoption of more efficient processes and practices for New Zealand pork products through its R&D programmes.

The Board is funded by producers through a levy paid on all pigs at the time of slaughter. The levy is currently set at NZ$4.45 (€2.40) per pig (plus government sales tax). Source: New Zealand Gazette, August 17, 2006, p. 40. The New Zealand Pork Industry Board will contribute A$50,000 in cash and A$100,000 in kind each year to the Pork Cooperative Research Centre in Australia, and as a core participant will be able to distribute the research outcomes to members during the next seven years.

(Source:www.thepigsite.com/newsletter/295/newsletter-7th-february-2005)

http://www.pork.co.nz/nzpork/annual_report/2005_annual_report.pdf

Australia

Australian Pork Limited (APL) is the representative body for Australian pig producers set up under legislation as a "a not-for-profit company combining marketing, export development, research, innovation and strategic policy development to assist in securing a profitable and sustainable future for the Australian pig industry". It is funded by a levy of A$2.525 (€1.54) per carcass at slaughter of which 17.5 cent (10.7 Euro cent) goes to finance a Residue Monitoring Programme and A$2.35 (€1.43) to APL. This is divided into A$1.65 (€1.01) for marketing and A$0.70 (€0.43) for R&D. In at least one state (Western Australia) an additional levy of A$0.60 (€0.43) per pig is collected by the Agricultural Produce Commission for R&D (Trezona, personal communication).

The Pork Cooperative Research Centre, set up in 2005, is an initiative by the pig industry in Australia, the Australian and state government and research organizations and some commercial agri-business firms to provide R& D support for the Australian pig industry. Its mission statement says "the CRC aims to enhance the efficiency and cost competitiveness of the Australian pork industry, while maintaining environmentally sustainable agricultural practices allowing the efficient production of innovative pork products from enhanced grain resources and with improved feed conversion efficiency.

The CRC will have an annual budget of c. A$12.0 million (€7.3 million) for research, development and training.

The National Centre for Pork Industry Training and Education was established with support from Australian Pork and The CRC for an internationally competitive pork industry (Pork CRC). "The National Centre was developed to provide positive images of the industry and quality training/education delivered by motivated people to greatly enhance recruitment and retention into the Australian pig industry."

"The aims of the National Centre are:

- Attraction of a greater number of more qualified and better motivated workers to all levels of the Australian pig industry.
- A higher piggery staff retention rate through better training/career development and other support systems.
- Improved technical and management skills in senior piggery staff through better more flexible training options."

Sources:
1. http://www.nationalporkcentre.com.au/:
2. Pork CRC Annual Report 2005-2006.
http://www.porkcrc.com.au/publications/report.pdf
3. Australian Pork Limited Annual Report 2005-2006.
http://www.australianpork.com.au/media/2005-2006.pdf

USA
The National Pork Board (NPB) in the US administers a checkoff programme of $0.40 (€0.31) per $100 dollars value of pig sold or imported. NPB had a gross income in 2005 of $63.3 millions (€48.9 millions) of which 61% was allocated to national promotion programmes, 34% for national research and education programmes and 5% for national customer information programmes.

About 20% of checkoff funds was returned to the pig producer bodies in the individual states.

The mission of the NPB is described as: "The National Pork Board harnesses the resources of all producers to capture opportunity, address challenges and satisfy customers." And its purpose as "The National Pork Board contributes to the success of all pork producers by managing issues related to research, education and product promotion and by establishing U.S. Pork as the preferred protein worldwide."

An analysis of the returns to the pork checkoff programme estimated the return to the industry of at least $4.79 for every $1 invested in the checkoff programme.

Source: 2005 – Year in review
http://www.pork.org/NewsAndInformation/News/docs/2005%20Annual%20Report.pdf

Source: Davis, G.C., Capps, Jr., Oral, Bessler, D.A., Leigh, J.H. and Nichols, J.P. (2000). An Economic Evaluation of the Pork Checkoff Program. A Report to the National Pork Board

Canada
Prairie Swine Centre Inc. (PSC) is a non-profit research and technology corporation with expertise in three disciplines – behaviour, nutrition, and engineering. The mission of Prairie Swine Centre Inc. is "*to be a Centre of Excellence in research, graduate education and technology transfer, all directed at efficient sustainable pork production.*" Through the development of original, practical research results the research program, with a decidedly near market emphasis, creates information to improve the financial position of pork producers by defining feeding and management systems that maximize net income. In addition, the Centre develops information to address issues and opportunities in environment and animal well-being.

PSC was originally the swine research and teaching facility of the University of Saskatchewan.

In 1987, the University of Saskatchewan and the Saskatchewan Hog Marketing Commission joined forces to review the operations and function of PSC. An advisory board of industry representatives identified the need for increased emphasis on grower-finisher research and the need to work more closely with the commercial pork industry.

The mandate of Prairie Swine Centre includes research, technology transfer and graduate education. The research program seeks to fill a niche identified by the pork industry, to conduct near market research that can be applied within a one to seven year time frame. Because of those close linkages with the commercial

pork industry, technology transfer is emphasized as a central part of the Centre's operation.

Core funding for the Research and Technology Transfer Programs at Prairie Swine Centre is provided by pork producer agencies in Saskatchewan, Alberta and Manitoba, as well as Saskatchewan Department of Agriculture and Food. This core funding provides the basic support for the Centre's research objectives, as well as a Technology Transfer program.

Core funding is multiplied many times over (currently five) by applying for specific project funding from additional funding sources. Project funding comes from both the public sector (e.g.: ADF, Alberta Agriculture Research Institute, NSERC and USDA) and the private sector (e.g.: feed and drug companies and equipment manufacturers). Contract Research represents a growing source of funds to the Centre.

Sale of stock is also an important revenue item for the Centre. Animal sales must cover the cost of animal production, and should also provide funds to support the Centre's Research and Technology Transfer programs. Excess revenues from the sale of stock are also set-aside in an income stabilization fund to support the Centre when market prices weaken.

Source: http://www.prairieswine.com/about/index.html

Saskatchewan
Sask Pork is a producer managed organization operating programmes and research for the Saskatchewan pork industry and promotion of hogs and pork produced in Saskatchewan. It is funded from a checkoff levy of Can$0.75 (€0.49) per pig (2003 figure).

Source: http://www.saskpork.com/pdfs/2004_annual_report.pdf

Alberta
The Alberta Pork Producers Development Corporation (known as Alberta Pork) is a self-sustaining, non-profit oriented association that operates on behalf of Alberta pork producers. The organization currently collects a Can$1.00 (€0.66) per head service charge on market, breeding, or cull animals in addition to the 25 cents (€0.16) per head service charge on animals 22 kg or less (weaners). These funds are used for the development, growth and promotion of the Alberta pork industry.
Source:
http://www.albertapork.com/Uploads/About_Us/Annual_Report/2005/GM.pdf

Staffing of pig production research in Teagasc amounts to 3.5 researchers and in UCD to 1 researcher who also has a teaching role. This compares very unfavourably with research staffing in other countries even in those with industries of comparable size such as Australia.

22. Technology transfer

22.1. Teagasc

Teagasc Pig Development Officers (currently five in number) service pig producers from offices in Moorepark, Athenry, Tullamore, Ballyhaise and Bagenalstown. Producers pay an annual fee for the independent business and technology service which is based on the analysis of herd performance data, feed costs and financial records and benchmarking these against industry averages using the Teagasc PigSys programme.

Means of technology transfer employed by Teagasc include:

- Farm visits
- Review of pig unit business operations
- Annual farmers' conference
- Presentations to technical conferences
- Bi-monthly newsletter
- Popular articles in newspapers and magazines
- Meetings with producers
- Scientific papers

Pig producers should be encouraged to make more widespread use of electronic communication methods and Teagasc in turn could deliver more frequent and more timely information by e.g. email and website.

The Teagasc R& D programme is monitored by the Pig Industry Development Committee on which sit representatives of the various sectors. The effectiveness of this committee could be improved by more deliberation by the bodies represented prior to meetings.

22.2. Private sector

Feed suppliers and supplement suppliers provide a technical backup service to their customers. Their role is primarily one of sales and debt collection with some technical support for the products supplied and for the firm by which they are employed. Private sector consultants also provide services such as processing planning applications and license applications.

22.3. Veterinary

A small number of veterinary surgeons specialising in pig health provide a veterinary service to pig producers, who may only purchase most medication on

presentation of a prescription. Producers will have used the veterinarian as a consultant on the herd health and biosecurity programme and the vet is required to visit the unit and inspect the pigs at least every 60 days. The intensity of pig inspection at these visits varies greatly.

23. Environmental issues

23.1. The planning process

Planning permission is required for agricultural buildings for the rearing of pigs when the floor area exceeds 75 square metres (SI 600 of 2001).

An intensive pig unit will have a roofed-over area of close to 1.0m^2 per finishing pig, 5.0m^2 per breeding sow (including progeny to 30kg liveweight) and 10.0m^2 per breeding sow (including progeny to 90kg liveweight) in an integrated unit.

In the past the main issues in relation to the granting of planning permission for pig units related to the spreading of pig manure and the controls that Local Authorities saw fit to apply. The application of animal manure to farmland is now regulated under S.I. 378 (2006) and the distribution of manure from all pig sites must comply with these regulations. This allows the Planning Authorities make their decisions of granting or not granting permission based upon the suitability of the site of any proposed pig development, having regard to the management of manures and wastes generated on the site. Once the pig producer can assure and vouch that there is sufficient land available to the unit to spread the manure produced in accordance with SI 378 there should be no requirement for the detailed "third party" information that was required in the past.

The planning procedure

Once a valid application is received by the Planning Authority (local county council) the application must be decided upon or a request for further information must be made within 9 weeks (unless an extension in the decision making period is sought by the Planning Authority and is given a written consent by the Applicant). The grant of permission to develop will usually be subject to a number of conditions. Once granted a permit is valid for 5 years.

Objections, Appeals, Bord Pleanala

An Applicant for permission and any person who made submissions or observations in writing in relation to the planning application to the planning authority in accordance with the permission regulations and on payment of the appropriate fee, may, at any time within 4 weeks of a decision by the Planning Authority appeal to An Bord Pleanala against a decision of the Planning Authority.

The stated objective of An Bord Pleanala is to deal with 90% of cases within 18 weeks (the statutory time objective). The percentage of cases being decided

within the 18 week statutory time objective has fallen back from 78% in 2005 to 53% in 2006. This can lead to delays in decisions for granting of pig developments.

Fees for Planning

The fees for planning permission applications are set in Schedule 9 of the Planning and Development Regulations, SI 600 of 2001. Pig units may be considered as "agricultural" or "commercial" developments in different counties. The "development" charges that accompany some planning decisions can be high and vary from one local authority to another as do the "conditions of planning" applied. There is need for greater transparency and consistency across local authority areas in the application of these "development charges".

Environmental Impact Statements (EIS)

An Environmental Impact Statement is mandatory if a **proposed pig development** exceeds:

- 2000 places for production pigs (over 30kg) in a finishing unit,
- 400 places for sows in a breeding unit or
- 200 places for sows in an integrated unit (as per Class 1 (e) (ii) of Schedule 5, Part 2 of the Planning and Development Regulations, 2001)

A local authority may request an EIS for developments below the thresholds but is not required by law to do so.

23.2. Licensing

From 8th May 2007 every pig unit will be required to have applied for an Integrated Pollution Prevention and Control (IPPC) license if it exceeds the following:

- 750 places for sows in a breeding unit
- 285 places for sows in an integrated unit
- 2000 places for production pigs

These limits apply whether the stock are within the same complex or within 100 metres of the same complex.

- "Breeding unit" means a piggery in which pigs are bred and reared up to 30kg in weight.
- "Integrated unit" means a piggery in which pigs are bred and reared to slaughter.
- "Production pig" means any pig over 30kg in weight which is being fattened for slaughter.
- "Sow" means female pig after first farrowing

Using these definitions and assuming typical sow replacement rates the limits in terms of mated females as traditionally categorised are approximately:

- 875 places for mated females in a breeding unit
- 340 places for mated females in an integrated unit
- 2000 places for production pigs

These regulations are set out in S.I. 279 of 2006.

The licensing of pig units should be more manageable if it can be agreed that the requirements of SI – 378 (2006) supersede the conditions in individual licenses. If the Licence is "**Site-based**" and sensible there should be no problems in compliance. Some of the problems in the past have related to the issue of manure being a "waste" and being policed accordingly.

The cost of a license application and ongoing renewal and monitoring costs has had the unintended effect of making medium sized units (just above the threshold) less viable and promoted development of larger units.

23.3. Nitrates Action Plan

Pig producers have a number of concerns in relation to certain environmental issues. The most immediate issues relate to the management of manure to comply with ***SI – 378 – EC Good Agricultural Practice for Protection of Water Regulations of 2006.*** Other pending legislation that could affect their business will be in relation to the Water Framework Directive, the Groundwater Directive and Greenhouse Gas Emissions Directive. While pig producers have no issue with having to comply with the legislation they are concerned that there may be a "bias" from certain sections of the Department of Environment, Heritage and Local Government that could affect their economic viability in the long-term.

Government pronouncements tend to be supportive of the development of the pig industry e.g. Smith (2005). However, pig producers are not reassured that government policy in relation to environmental issues (as applied to the pig sector) is science based. There is a perception among a substantial body of producers that Department of Environment, Heritage and Local Government has as its objective the elimination of the pig production sector. Legislation is an important determinant of whether an industry such as pig production expands or contracts (Informa Economics, 2005).

Pig producers themselves need to recognise that environmental controls have become necessary. However, it would appear that despite its small contribution to manure nutrients being applied to land that the sector has been singled out for special treatment e.g. SI 378 of 2006.

SI – 378 (2006) coupled with the European Court Judgement made in 2005 (ECJ case 416/02), defining animal manure not to be a waste when used to fertilise farmland in accordance with Good Farming Practice, should have the positive effect of clarifying the situation where pig manure can be used by other farmers. There is a fear among customer farmers of their Single Farm Payment being penalised if they inadvertently exceed the 170kg Organic N (hectare limit set down in S.I .– 378 (2006). Pig producers and all concerned in delivering information in relation to the regulations need to help farmers overcome such concerns. A positive promotion of the benefits of using pig manure must be pursued by all concerned (i.e. IFA, Department of Agriculture, Fisheries and Food, Teagasc, etc).

Pig producers will need assistance in assuring their farmer customers that the use of pig manure in compliance with S.I. – 378 (2006) is not going to lead to an extra level of inspection by the relevant authorities.

DAFF appears to be promoting the processing of manure and in particular separation into solid and liquid fractions. There is a need for a clear ruling from DAFF, DOEHLG and EPA as to whether processing of manure will result in one or other fraction being considered a "waste" and being policed under waste handling regulations rather than as "manure". Relevant processing options might include:

- Separation into solid and liquid fractions
- Anaerobic digestion (manure alone or manure commingled with organic waste)
- Residue after nitrification/denitrification.

24. Manure management

24.1. Regulatory control

Apart from water pollution aspects, the principal regulatory control on manure spreading to date has been the licensing system and so applied to bigger units only. SI 378 of 2006 extends these controls to all farms using more strict criteria and a requirement for more detailed record keeping.

24.2. Land application

If possible, pig manure should be utilised as a fertiliser to meet the crop requirements on lands in the vicinity of the unit thereby minimising transport costs.

Pig manure is used as a substitute for chemical fertiliser. It is a rich source of N, P, K and trace minerals. The concentration of each nutrient varies with the dry matter content (water dilution) and with the diet fed. Formulation of feeds to contain lower levels of crude protein and phosphorus means that the N and P concentrations in manure can be significantly reduced. However, this will reduce its fertiliser value. The application of SI 378 should take into account the

efforts of pig producers and the feed industry to minimise manure nutrient excretion.

24.3. Contribution of pig manure to nutrient application to land

The contribution of pig manure to the amount of fertiliser nutrients being applied to land amounts to about 13,500 tonnes N and 2,600 tonnes P compared with about 360,000 tonnes and 35,000 tonnes of chemical N and P respectively. This is 3.3% of the chemical N and 7% of the chemical P used on farms in Ireland annually (Table 23.1).

Table 23.1. Fertiliser use in Ireland 1989 to 2005 (1,000 tonnes)

Year	Nitrogen (N)	Phosphorus (P)	Potassium (K)	Total Fertilisers
1989/90	379	65	158	1793
1990/91	370	63	153	1745
1991/92	358	59	148	1646
1992/93	378	61	152	1767
1993/94	405	60	145	1820
1994/95	429	62	151	1921
1995/96	417	63	152	1896
1996/97	380	54	132	1699
1997/98	432	50	124	1830
1998/99	443	51	126	1850
1999/00	408	49	123	1730
2000/01	369	43	107	1546
2001/02	364	42	106	1523
2002/03	388	44	111	1628
2003/04	363	43	111	1538
2004/05	352	39	101	1479
2005/06	345	37	93	1427
2006/07	322	32	85	1310 (Est)

Source: DAFF

24.4. The Treatment of Pig Manure

Various methods of treatment have been devised. These include biological, chemical and physical methods as well as various combinations of these methods. There is on-going research throughout the world into treatment methods.

There are a number of reasons who processing of manure might be considered including:

- To reduce handling and transport costs while facilitating its use as a fertiliser
- To reduce the nutrient content and thereby reduce the land area required while complying with regulations.
- To reduce odours
- To utilise pig manure as an energy source

Some treatments being proposed or considered such as anaerobic digestion, separation do not change the quantity of N and P to be dealt with. This needs to be taken into account in evaluating investment in manure treatment.

For a detailed discussion on manure processing technology see Martin (2006).

24.5. Treatment Costs

The initial capital investment (less any grant-aid obtained) will have to be financed consisting of interest payments in addition to the repayment of the capital borrowed.

The treatment facility can be depreciated over 10-15 years but not over more than 20 years for any part of the facility.

Operating cost include energy costs as well as repairs and maintenance. There are also likely to be additional labour costs involved.

Treatment costs can be expressed per m^3 treated. Reducing the volume of manure to be treated is critical in minimising treatment costs. This means minimising the amount of water used or allowed to get into collection/storage tanks without compromising the welfare or performance of the pigs. Water management to minimise volumes is the starting point in dealing with manure.

The most common treatment options that have been considered include the following;

- Separation
- Anaerobic digestion
- Nitification/De-nitrification

The different treatments have advantages and disadvantages. Any proposals in relation to manure treatment need to take account of whether this treatment changes the classification of pig manure to that of waste and, thereby, making it subject to Directive 75/422. (i.e. the Waste Directive). The costs of manure treatment by the methods listed above is prohibitive when compared to transport and application of the manure to land as fertiliser.

The following points should be carefully considered:

- Pig manure is a rich source of plant nutrients and is valuable.
- Irrespective of how it is used or treated, aim to maximise the dry matter content.
- Any consideration of manure treatment must be based on clear reasons for adopting the technology and a proper cost/benefit analysis.

- Separation into solid and liquid fractions can be used to deal with the high P content of raw manure by moving it to a separate site but the cost of separation and handling two streams of material is very high.
- Nitrification/de-nitrification is only relevant when there is no economical solution to excess organic N.
- Anaerobic digestion has nothing to offer in dealing with excess N and P.
- Successful manure treatment involves a major capital investment and very substantial running costs

24.6. Farm Waste Management Scheme

A scheme of grant aid for manure storage was announced in 2006 with a closing date for applications of 31/12/2006 and a final date for completion of works of 2008. This scheme also allowed grant aid for feeding systems, decanter centrifuge separators, specialised manure handling equipment, equipment for application of slurry, farm yard manure and soiled water.

25. Food safety issues with pigmeat

Food safety issues associated with pigmeat include the presence of pathogens (any organism that is capable of producing disease www.ucbiotech.org/glossary/) and parasites (an organism that lives off another animal, but does not generally kill it www.ecobugs.com/glossary.htm) and also the presence of undesirable substances such as antibiotics.

A number of pathogens are associated with food production. The one of most relevance to pig production in Ireland is Salmonella. Other pathogens which are potentially important include Verocytoxigenic E. coli, Campylobacter spp., Cryptosporidium spp., Listeria monocytogenes, Yersinia enterocolitica and Staphlococcus aureus.

25.1. Salmonella

Salmonella is one of the most common food poisoning agents. Infection can cause some or all of the following symptoms: nausea, vomiting, abdominal cramps, diarrhoea, fever and headache 6 to 48 hours after ingestion. The illness can last for 1 to 2 days but may be prolonged depending on the immune status and the particular type of Salmonella.

In pigs, Salmonella is generally seen in 1st and 2nd stage weaners and manifests itself as diarrhoea or septicaemia and can result in death if untreated. The asymptomatic carrier pig is of greater food safety significance than the pig showing clinical symptoms. Pigs can be carriers of Salmonella and shed the bacteria in the faeces intermittently especially when stressed. Handling and transport around slaughter result in increased shedding of Salmonellae and has the potential for carcass contamination.

The national Salmonella control programme (described by Kelliher, 2002) aims to reduce carcass contamination by reducing the incidence of carrier pigs at slaughter.

Herds are categorised into low, medium and high incidence (Category 1, 2 and 3 respectively) based on the results of regular testing of meat juice samples from pigs at slaughter. Herds are assigned to Category1, 2 or 3 if the percentage of positive for Salmonella antibodies is (1) less than 10%, (2) 10 to 50% and (3) over 50%. The percentage positive is a weighted average of the three most recent tests taken 3 to 5 months apart. A herd certificate valid for five months is issued.

Responsibility for ensuring a test is carried out rests with the herd owner and if testing is not carried out within the required period then the herd will not have categorisation and must be treated as category 3. Herds selling pigs to Northern Ireland are not tested unless the producer organises this e.g. by blood testing on the farm.

Pigs from category 3 herds must be slaughtered on separate days or times. Head meat and selected offal from these pigs may not enter the food chain or do so only if heat treated. The extra cost of handling pigs from category 3 herds is at present borne by meat plants at an estimated cost of €4 per pig. When the Salmonella control scheme was introduced a penalty system was envisaged for category 3 herds as is the case in Denmark.

Herds without a valid certification are subject to the same restrictions as category 3 herds. At present about 4,000 pigs per week are being restricted and about 50% of these are pigs are from herds without a valid certificate.

25.2. Parasites

Ascaris suum: The roundworm (A. suum) is probably the most widespread of the worm parasite but (at least in pigs kept indoors) is easily controlled by anthelmintics and hygiene. During its life cycle it migrates through the tissues and can cause liver lesions (milk spot) which result in downgrading/condemnation of livers.

Other parasites of pigs are more a concern for productivity (growth rate, health, feed conversion efficiency) and carcass appearance e.g. mange than for food safety. There is anecdotal evidence that the level of liver condemnations is higher than it needs to be.

25.3. Quality assurance at the meat plant

Ante-mortem inspection: Each animal presented for slaughter is examined by the veterinary inspector to assess its fitness for slaughter for human consumption.

Post-mortem inspection: Each carcass is subjected to post-mortem inspection by a veterinary inspector to assess its fitness for human consumption. Meet unfit for human consumption is not allowed to enter the food chain.

Checks on hygiene rules and plant operations: The veterinary inspector carries out check on all aspects of plant hygiene and operations including slaughtering and carcass dressing, handling of edible and inedible offals, cutting and further processing, wrapping, packing, storage and transport. The results of these checks are recorded and, in the case of non-compliance, appropriated enforcement action is initiated.

In addition to inspection by the Irish authorities meat plants are subject to inspection and auditing by customers e.g. retail chains and secondary processors. Some plants are licensed by the US Department of Agriculture who carry out regular audits.

The Bord Bia Pigmeat Quality Assurance (PQA) Scheme is an integrated scheme involving the farmer and the processing plant working in partnership to provide the customer with quality assured product. The scheme was first introduced in 1989 and was substantially revised in 1997 to incorporate recognized Internationally Quality Management Systems, Hazard Analysis and Critical Control points (HACCP) and EU Food Hygiene Legislation.

A revised scheme PQA scheme (revised to EN 45011 Standard) was introduced in 2007.

It would appear appropriate that farm audits under the PQA scheme be funded by DAFF as is already done for the beef QA scheme.

25.4. Undesirable substances in meat

Mycotoxins

Mycotoxins are toxic metabolites of various fungal species. Due to their chemical stability, some mycotoxins such as ochratoxin A persist not only in feed ingredients such as stored cereals but also in various products from animals consuming mycotoxin contaminated feed. There is increasing evidence that ochratoxin A occurs in slaughter pigs and their feed in areas such as Northern Europe. Ochratoxin A is a mycotoxin produced by the Aspergillus and Penicillium species of storage molds. Its presence in animal products is significant because it is a well characterized nephrotoxin (i.e. is poisonous to the kidney).

Residues from animal remedies

Antibiotics used for the treatment of animal diseases must be prescribed by a veterinary surgeon. The use of antibiotics for growth promotion purposes ended

in January 2006. Animal remedies must be administered in accordance with the conditions of use of that product. Specified withdrawal periods must be observed if the animals products are intended for human consumption.

It is a legal requirement that all treatments given to animals intended for human consumption must be recorded. The name of the animal remedy, the amount given and by whom and the withdrawal periods are some of the records that must be kept in an 'Animal Remedies Register'. Pig units must be visited by a veterinarian every 60 days.

Residue sampling: Under the residue monitoring plan drawn up in compliance with Council Directive 96/23/EC, veterinary inspectors at slaughtering plants take random and targeted samples of specified tissues for residue analysis at the Central Meat Control Laboratory, the State Laboratory and other participating laboratories. The veterinary inspector may also take samples from any meat where there is a suspicion that such meat contains residues above the legal limits. In these cases the sample meat is detained until the results are received. Any meat found to contain residues is condemned and is removed from the food chain.

The meat plants themselves carry out systematic screening of carcasses (in some cases all carcasses) for residues. Any samples found to be positive must be reported to DAFF.

Where residue violations are more likely to occur e.g. sow carcasses there is additional targeted sampling of such carcasses.

The incidence of violative residues of antimicrobials in pig meat has declined substantially as shown in Table 24.1 to a current level of about 1 per 1000 sampled using a targeted samling procedure (NFRD, 2006).

Table 24.1. Results of residue testing of pigmeat for antimicrobials

Year	2001	2002	2003	2004	2005
No. samples tested	52,030	56,757	48,200	31,476	24,924
No. non compliant	346	280	186	91	26

Hormones are never administered to pigs to improve growth rate or other quality attributes. Similarly, beta-agonists used in the past to improve leanness in beef cattle have not been used in pigs.

Sources of Information

Pigmeat Quality Assurance Scheme (PQAS).
http://www.bordbia.ie/go/Industry/Producers/quality_schemes/pork.html

Department of Agriculture, Food and Rural Development (2001). The Safe Food Chain.. Every Link is Vital
http://www.agriculture.gov.ie/publicat/FOOD_SAFETY_DOC.pdf

Food Safety Authority of Ireland (2005). Prudent use of medicines, pesticides and chemicals on farms to ensure food safety. www.fsai.ie

Teagasc www.teagasc.ie/nfc/research/foodsafety/fs-pathogens.htm

26. Animal health issues

A high health status in pigs or other animals is achieved by founding the herd using pigs free of the most debilitating diseases (mainly enteric and respiratory diseases) and striving by good biosecurity practices to exclude infection. Exclusion of disease is easier in intensive rather than extensive systems. Within the pig unit spread of disease can be controlled by segregation of animals by age, by using smaller numbers in each airspace, control of incoming stock and control of vectors such as people, equipment and wildlife. Over time there is almost always a deterioration in herd health and periodic destocking and repopulation should be considered.

Destocking results in a significant reduction in income for a period and whether it is a wise decision depends on (1) the current health status of the herd, (2) improvrovement in performance of the new herd and (3) how long the new herd will retain its status. For a discussion on destocking and repopulation see McKeon (2006)

26.1. Biosecurity/Overview

Most of the common pig production diseases occur in Ireland. However, serious diseases such as Foot and Mouth Disease and Swine Fever have not occurred in pigs in Ireland in living memory.

Freedom from these and other serious diseases is recognized as contributing a competitive advantage on Irish producers in terms of production costs. This good health status also means that Ireland is an attractive source of breeding stock for foreign buyers. The preservation and improvement of this health status is crucial to the maintenance and expansion of this trade.

Since 1993 the National Pig Health Council has implemented voluntary codes of practice for the importation of live pigs and semen from abroad with the co-operation of the pig breeding companies based here. These involve pre and post importation health checks and isolation periods for imported stock.

While there is a high level of compliance with the code from firms located within the Republic of Ireland there is concern over imports over the border with Northern Ireland

In the intervening period two diseases not previously recognized in Ireland have occurred here. PRRS (Porcine Respiratory and Reproductive Syndrome) was first found in 1999 and must have spread from Northern Ireland where the disease was detected earlier.

Post weaning Multi systemic Wasting Syndrome (PMWS) is a serious disease of unknown/unproven aetiology which is now to be found in many countries throughout the world. This problem is now widespread throughout the production sector and is a key factor in high mortality and poor thrive in growing pigs.

The issues around pig health and disease cannot be separated from the herd size structure of the industry in Ireland. At official level it is essential that any disease control and biosecurity measures be implemented on an all-Ireland basis.

Not alone is the average sow herd size 424 sows but the vast majority of pigs are bred and finished on the one site. Especially on the larger units this results in large concentrations of pigs together and impacts very significantly on disease control and eradication measures.

Biosecurity procedures on many pig units leave a lot to be desired and expose the units to infection with any one of several production diseases. Areas which need attention include entry to the unit of veterinarians, service personnel, replacement breeding stock, fencing and exclusion of wildlife. For a review of biosecurity practices and recommendations for pig units in Ireland see Lynch et al. (2003).

26.2. Aujeszkys Disease

The eradication of Aujeszkys disease(AD) has been a very drawn out process.

Considerable progress has been made more recently in eradicating this disease from the Republic. With the number of positive herds now less than 8, decisive action is required to complete the task. Failure to push on and complete the job now runs the risk of, not alone, not achieving eradication but of having the disease spread to units that are presently clear. Clear herds adjacent to infected units or to farm land receiving pig manure from an AD positive unit should be informed and be aware of the risk posed to them.

Of no less importance is the eradication of the disease from Northern Ireland given the free movement of pigs to and from Northern Ireland. Close co-operation with the veterinary and animal health authorities is essential in the interests of producers North and South.

26.3. PRRS

PRRS is a serious disease but in conjunction with other diseases such as PMWS, Swine Dysentery or Actinobacillus pleuropneumonia the impact is considerably multiplied. Movement restrictions apply to herds found to be PRRS positive. These prove to be a hindrance to the owners such that there is a reluctance to test for the presence of the disease on the part of herds that have not been found to be positive. It is understood that PRRS is endemic in Northern Ireland. All cull sows from Northern Ireland are transported to the Republic for slaughter and pose a significant risk to clear herds here.

As in the case of AD, herds adjacent to positive herds or herds close to lands used for manure spreading from PRRS positive herds are not informed of the situation or of the risks.

While the eradication of PRRS appears an unrealistic objective at present a coherent policy to curtail the spread of the disease is required from Department of Agriculture and Food and from pig producers.

26.4. Post-weaning Multisystemic Wasting Syndrome (PMWS)

Many pig units have incurred serious production and financial losses in recent years due to this pig health problem. The development of vaccines, autogenous and commercial, offers some prospects for a solution if at a substantial cost to the producer.

26.5. Salmonella Control Programme

See above section 24.

26.6. Other production diseases

Mycolplasma pneumonia is largely controlled by use of vaccines. In some cases, dosages and timing of application have been modified by veterinary surgeons.

Swine dysentery has potential to cause major damage to units.

Actinobacillus pleuropneumonia has been an intractable problem on many units and the reason for destocking/repopulation in several cases.

Colitis/ileitis – A new enteric condition that has become much more prevalent in recent years.

Coccidiosis – has become more prevalent in suckling pigs. The condition is caused by a parasite and use of appropriate disinfectants and oral dosing will help in control.

26.7. Veterinary Laboratory Service

The Department of Agriculture and Food have Regional Veterinary Laboratories at key locations throughout the country. Given the limited amount of pig work required to be carried out at any one centre the opportunity for staff to develop expertise in the investigation of pig health problems is limited.

Existing private veterinary practitioners require easy access to dedicated specialist pig laboratory and staff. The concentration of pig diagnostic services into fewer but substantially larger units is feasible with the improved accessibility by courier or other methods of transport.

The designation of one central laboratory which would provide the requisite expertise in pig health and facilities should be considered and staff provided with the necessary training.

26.8. Pig Health Monitoring

Very considerable information on farm pig health problems can be obtained through the post-mortem of pigs on the slaughter line. Done on a regular basis, and typically every 3 months, an examination of a sample of pigs would provide the unit and the veterinary adviser with excellent information enabling appropriate changes to be made to herd health programmes. Currently, to obtain this information the veterinary adviser has to visit the slaughter plant when pigs from the unit are being slaughtered. Veterinary advisers are seriously curtailed in doing this work by problems in relation to timing, travelling and compliance with restrictions on visiting pig units subsequent to plant visits.

Proposals to develop a national pig herd health monitoring system, initially on a pilot basis, would have provided a wealth of useful information for individual units and deserved support. It is disappointing that this proposal has not been supported

The scheme proposed was separate from the inspections carried out on behalf of the Department of Agriculture and Food and for which producers pay a levy per pig. These relate to food safety issues.

A national Pig Health Monitoring Scheme should be re-considered and DAFF should consider providing some funding at least for start-up.

26.9. Pig Health Council

Established in 1993 in response to concerns about PRRS in Britain and Europe as well as the lifting of the requirement to have imported livestock placed in quarantine on arrival in this country, the NPHC serves as a consultative forum representing the various sectors of the industry including DAFF on issues of pig health. As well as overseeing the voluntary protocols on pig importations the NPHC provides guidance on programmes to improve pig herd health. The role of the NPHC needs to be reviewed and adapted to the changes that have been taking place in pig production and in the industry.

27. Animal Welfare issues

Developments in animal welfare on pig farms over the next 10 years will primarily be driven by legislation. EU legislation governing the welfare of pigs on farms is laid down in Commission Directive 2001/93/EC and in Council Directive 2001/88/EC (amending Directive 91/630/ EEC laying down minimum standards for the protection of pigs). The Irish Department of Agriculture and Food laid out the terms of this legislation in a booklet entitled 'Pig welfare requirements – On farm and in transit' (http://www.agriculture.gov.ie). Many of the amendments are already in place with others coming into force in 2013. However, there is evidence that the degree of compliance with aspects of the legislation is low. This follows from a series of animal welfare investigations carried out in Estonia, Italy, Latvia, the Netherlands, Poland, Portugal and Spain by the Food and Veterinary Office (FVO) in 2005. While Ireland was not included in these investigations it is likely that there are also producers here that are not fully complying with the legislation. It is crucial that any strategy for the development of the Irish pig industry advocates strict adherence to all existing and future welfare legislation. However, meeting aspects of the current legislation will pose an enormous challenge to producers predominantly owing to the added costs involved but also to the shortage of skilled labour.

In October 2007 the European Food Safety Authority produced two Scientific Opinions which were recently adopted by the Scientific Panel on Animal Health and Welfare (AHAW). One concerned fattening pigs and the other boars, lactating and pregnant sows and unweaned piglets: (http://www.efsa.europa.eu/EFSA/ScientificPanels/efsa_locale-1178620753812_AHAW.htm). It is possible that further legislation could ensue from these reports. There is doubt as to whether some of the legislation already in place resulted in a net improvement to pig welfare, particularly in the case of group housing for pregnant sows. This may be because the research on which such legislation was based predominantly employed behavioural welfare indicators. Curtis (2007) argues that animal performance measures are more objectively measurable indicators of an animal's state of being (welfare) in the

absence of an adequate scientifically informed understanding of its conscious feelings. In any case the pig industry needs to be aware of any proposed animal welfare legislation and make reasoned submissions in advance. For this reason 'major welfare risk' areas identified in the aforementioned reports are highlighted below.

Ultimately, trained staff with a good temperament and attitude to animals, feeding adequate amounts of a nutritionally adequate diet and good housing conditions are the principal determinants of good animal welfare. The same factors promote high productivity. The primary role of the committed stockperson in promoting well-being cannot be over emphasised. Several studies show better growth rate in pigs and better fertility in sows which are treated well.

27.1. Environmental enrichment/manipulable materials

Paragraph 4 of the Annex to Commission Directive 2001/93/EC states that from 1 January 2003 "pigs must have permanent access to a sufficient quantity of material to enable proper investigation and manipulation activities, such as straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such…".

This legislation is supported by scientific evidence that pigs have a requirement for environmental enrichment to satisfy their motivation to explore and forage and that they benefit both developmentally and in terms of welfare from the presence of environmental enrichment. However, the FVO reports found that some farmers were not providing manipulable materials whilst others were using less suitable materials such as chains. One of the most important quality of an enriching substrate is that the pig gets 'feedback' from it's interactions with the material. In effect this means that the material must be destructible or edible. There is unanimous agreement among pig welfare scientists (Bracke, 2006; AHAW, 2007) that chains are not effective enriching materials. Materials such cloth strips or rubber 'toys' are more effective in occupying pigs but such items do not last long very long.

There are two important constraints on the use of substrates such as straw.

The first is labour availability. The daily replenishment of enriching substrates is a time consuming task. Recent results from Hillsborough show that it takes approximately 6 minutes longer to clean out pens and re-fill racks with straw for large groups of dynamic sows then to simply clean the pens. Even feeding sows a high fibre diet results in a significant increase in cleaning time.

The second constraint is the widespread use of slatted flooring and liquid manure systems. Most of the recommended substrates are not suitable for use in such systems and there has been a glaring lack of research on the types of substrate that are compatible with slatted systems. Recent research from

Hillsborough and Moorepark suggests that there are ways of overcoming the latter problem through the use of racks. Spent mushroom compost, straw and silage have been provided to pigs and sows in racks with varying degrees of success.

There are other problems such as the limited availability of straw and spent mushroom compost and the potential environmental and health implications surrounding the use of peat compost.

27.2. High fibre diets for pregnant sows

Under legislation sows and gilts must be given sufficient quantity of bulky or high-fibre food in addition to their normal high energy food to prevent them from suffering from hunger during pregnancy and possibly developing stomach ulcers. This is a separate and different requirement from the need to provide manipulable material unless the material is edible as in the case of straw. This legislation is in force since 2003 but is proving difficult to comply with owing to the lack of information on ways of delivering high fibre diets, optimum fibre inclusion levels, best ingredients etc. A combined research initiative between Hillsborough and Moorepark is addressing some of these issues.

The research showed that provision of straw in racks to group housed sows did little to improve the welfare sows on a normal concentrate diet. This was because competition for access to the racks stimulated aggression between the sows and the quantity of straw was inadequate to improve gut fill. In free access stall systems, straw racks were more successful in improving welfare because each sow had access to her own individual rack. Indeed when provided with a relatively high fibre diet based on soya bean hulls (9% crude fibre) the effects were as good as feeding a 15% crude fibre diet based on sugar beet pulp without providing straw.

In conclusion high fibre diets offer improvements to sow health and welfare and are one of the most promising ways in which the welfare of sows in groups can be improved.

27.3. Tail docking

Annex of Directive 2001/93/EC prohibits routine tail docking and stipulates that this procedure may only be carried out once other measures to prevent tail biting, such as improving the pigs' conditions, have been taken.

There is evidence to suggest that significant improvements will be made to pigs' environment by providing appropriate enriching materials and that this would reduce the need for tail docking. While it is difficult to address the cause of a sporadic outbreak of tailbiting and the causes in general are multifactorial, chronic tailbiting problems often reflect deficiencies in the pigs' environment.

The Committee on the Environment, Public Health and Food Safety called for a complete ban on tail docking in a recent report on a Community Action Plan on the Protection and Welfare of Animals 2006-2010 (2006/2046(INI)).

27.4. Teeth resection

Clipping of the incisor teeth in the pig soon after birth is practiced to reduce facial injuries to piglets and also damage to sows teats. Lewis et al. (2003) concluded that on balance grinding of the teeth is preferable to clipping even though it is a slower procedure. Leaving teeth intact was associated with an increased level of injuries to both piglets and sows with some evidence of increased mortality through overlying in litters with intact teeth. This is also the experience at farm level with leaving teeth intact. Grinding was the preferred method of teeth resection advocated in the recent Scientific Opinion of the AHAW working group.

27.5. Castration

In Ireland male pigs are traditionally not castrated as they are slaughtered at live weights lower than 100kg minimising the problem of boar taint. However, slaughter weights are increasing and with it, the risk of taint. The European Parliament agriculture committee recently called on the Commission to work towards a pan-European ban on the castration of piglets without anaesthetic. Few anaesthetics or analgesics are licensed for use in piglets. Furthermore, both general and epidural anaesthesia necessitate expert knowledge and are labour intensive. Hence, the use of local anaesthesia offers the best practical prospects for pain alleviation in piglets although it is not without disadvantages. In light of this, chemical or immuno castration should be considered as an alternative.

Immunocastration is used on a high proportion of male pigs in Australia. It involves two doses of vaccine in the later stages of finishing. The feed conversion efficiency and growth rate advantages of entire males are retained and boar taint in carcases is minimised. However the acceptability of the procedure among European consumers needs to be evaluated.

Rearing entire males to increasingly heavy weights in Ireland could lead to health and welfare problems because of aggressive and sexual behaviour. This class of animal was cited for particular concern in the recent Scientific Opinion of the AHAW working group of the EFSA. Recommendations for research in this area were provided in that report. Currently a research programme investigating husbandry effects on the behaviour and meat quality of these pigs is underway at Moorepark.

27.6. Farrowing crates

Welfare risks for sows in crates were identified in the Scientific Opinion of the AHAW working group of EFSA. These included: a) frustration and stress due to limited space and lack of foraging and nest building material and b) claw damage, shoulder lesions and teat damage. In piglets, frustration due lack of foraging material was identified as major risks. It was agreed that piglet mortality is a multifactorial issue and a major welfare problem. Great variation in piglet mortality in different systems makes it difficult to draw a general conclusion about the influence of farrowing systems on piglet mortality. The causes of piglet mortality and associated welfare problems may differ significantly between the different farrowing systems. The primary cause of piglet mortality is often unknown; however mortality due to crushing is known to be higher in loose housing systems. This was also the case in a recent large-scale study on indoor loose farrowing and crate systems, although no difference in total piglet mortality was observed. Breeding goals for large litter size implies increased piglet mortality.

In the expert opinion of the AHAW working group farrowing systems should allow for the handling of destructible nest material to enable investigation and manipulation activities. They conceded that this cannot be considered without consideration of the welfare of the piglets. Furthermore, they stated that the use of loose farrowing systems should be implemented only if piglet mortality in them is no greater that the mean level of mortality where the sows are kept in confined farrowing systems.

From this it appears that with the current absence of commercially viable alternatives it is unlikely that farrowing crates will be banned outright in the short to medium term. However, it does seem likely that it will be required for sows in crates to be provided with manipulable substrates to satisfy their motivation to perform nest building behaviour.

27.7. Pregnant sow housing

Probably one of the most dramatic and expensive areas of change in the coming years will arise from the limit on individual housing systems for dry sows.

Sow tethering became illegal in all Member States from 1st January 2006. According to the FVO good progress was made with the ban on tethering of sows being implemented ahead of deadline in most Member States.

The use of sow stalls after the first 4 weeks of pregnancy will become illegal in all Member States from 1st January 2013. This leaves five years in which to convert to group housing which is ample time to consider the different options available. Currently there is funding available from the Dept. of Agriculture to assist farmers in this conversion.

Some producers have already converted existing stall or tether accommodation into group pens to avail of the premium for stall- and tether-free pigmeat. These simple conversions may not comply with the legislation and in some cases are associated with sow welfare problems not observed in properly constructed, well managed group housing systems.

It was strongly argued by McGlone (2004; 2006) and Curtis (2006; 2007) that the ban on sow stalls and tethers may have disimproved rather than improved sow welfare.

Other authors have disagreed with McGlone's 2006 evaluation of gestation housing (Various authors, 2007). In the US an American Veterinary Medicine Association Task Force on housing for pregnant sows concluded that "no one system is clearly better than others under all conditions and according to all criteria of animal welfare" (AVMA Task Force, 2005). They cautioned that housing cannot be considered in isolation from other factors that influence welfare such as management, feeding system, environmental features and type of sow.

The Scientific Opinion of the AHAW working group of the EFSA is that they perceive there to still be problems with housing for pregnant sows. They concluded that housing of sows in individual stalls from weaning until 4 weeks after mating severely restricts their freedom of movements and causes stress. Further it does not allow sows to move and socially interact during a period of the reproductive cycle where they may be highly motivated to do so. In their recommendations for future research the AHAW suggest that additional work is required on the welfare and health effects of keeping group-housed sows in stalls from weaning to 4 weeks after weaning.

While individual stalls may limit movement and therefore contribute to poorer muscle tone, they do protect the sow from bullying and allow feed allocations to be matched to the sow's body condition and desired weight (and backfat) gain during pregnancy. This is more important in the post weaning period since sows are in variable body condition at this time.

27.8. Flooring

The behavioural repertoire of a pig includes standing, lying in various positions, walking to resources even at times when all other pigs are lying, exploration, thermoregulation, dunging and interacting socially including avoidance if attacked. These behaviours relate to different biological functions and motivations and are relevant to pigs in various husbandry conditions. The underfoot substrate is of fundamental importance to all of these behaviours and flooring came under increased scrutiny in both of the Scientific Opinions published this year.

It is widely accepted that claw injuries in sows are a problem. These are good indicators of poor welfare due to inadequate flooring. Inadequate flooring conditions in housing systems for pregnant sows and boars will result in pain due to claw and leg injuries as well as of overgrown claws. Poor flooring in farrowing systems can lead to painful limb lesions, shoulder lesions and teat damage in the sows as well as claw lesions and abrasions to the carpal skin of the piglets. Lesions also provide an entry for pathogenic organisms resulting in inflammation and pain. Leg disorders are also a problem in fattening pigs and cause poor welfare because of pain, reduced mobility and increased risk of victimisation.

The Scientific Opinions recommend that whenever injuries (foot lesions and lameness) are observed, appropriate flooring conditions in combination with management procedures should be applied to avoid that situation. To be able to make more precise recommendations, there is a need for more knowledge on how pig foot health is affected by different flooring materials.

Council Directive 2001/88/EC foresees that the Commission shall consider "appropriate legislative proposals on the effects of different space allowances and floor types applicable to the welfare of weaners and rearing pigs."

Current legal requirements for floor areas for growing pigs in groups are shown in Tables 26.1. Current farm practice is to allow more space than this.

Table 27.1. Minimum space allowance for growing pigs in groups (m^2 per animal)

Average wt, kg	***Minimum space, kg***
Up to 10kg	0.15
10 to 20	0.20
20 to 30	0.30
30 to 50	0.40
50 to 85	0.55
85 to 110	0.65
More than 110	1.00

Current legal requirements for floor areas for sows in groups are shown in Table 27.2.

Table 27.2. Minimum space allowance for pregnant sows and gilts in groups (m^2 per animal)

Group size	***Sows***	***Gilts***
5 or less	2.5	1.81
6 to 39	2.25	1.64
40 or more	2.025	1.48

Note: the minimum length of any pen side is 2.8m

Part of the floor (0.95m^2 for each gilt; 1.2m^2 for each sow) must be a designated lying area in the form of continuous sold floor i.e. the drainage openings must be no more than 15%. The remainder of the floor may be solid or slatted.

Boar pens must provide at least 6.0m^2 of unobstructed floor area or 10m^2 if the pen is used for natural service.

The legislation also specifies the permitted dimensions for concrete slats but not for slats made from other materials (Table 26.3).

Table 26.3. Maximum width of slat opening for concrete slats (mm)

	Maximum slot opening	Minimum width of solid
Piglets	11	50
Weaners	14	50
Finishers	18	80
Sows and gilts	20	80

27.9. Transport

The Diseases of Animals (Protection of Animals during Transport) Orders, 1995, 1997, 2001 and 2003 prescribe strict standards for animal handling and the state of vehicle repair and hygiene and, on long journeys, standards for feeding, watering, resting periods, journey times and stocking densities during transportation. A register of approved national transporters and hauliers is maintained by the Department.

Council Regulation 1/2005 apply from 5 January 2007 to persons transporting their own animals as well as commercial transporters. It sets down training and authorisation requirements for those involved in transporting and those handling animals at assembly centres. During 2005 the Department of Agriculture consulted with interested parties, including farming organisations, transporters of live animals, operators of Assembly Centres and Livestock Marts and welfare groups on the implementation of the Regulation.

During transport pigs are required to have at least 0.425m^2 /head or a maximum stocking rate of 235kg/m^2.

27.10. Lighting

Irish legislation states that all pig accommodation must be well lit (at least 40 lux) for 8 continuous hours a day. The light source can be either natural or artificial. Automatic time controlled lighting is the most practical method. The use of natural light should be encouraged. The lighting in pig houses should not be flashing and should be of a wavelength and intensity during the light period that allows pigs to discriminate the behaviour of other pigs and materials such

as straw and to show normal diurnal rhythms. The light level and distribution at times of inspection should be sufficient to allow each pig to be seen.

28. Quality assurance

28.1. Bord Bia QA

A Pigmeat Quality Assurance (PQA) programme was introduced by An Bord Bia in 1989 and revised in 1997. Farm auditing was organised by meat plans and carried out either by trained auditors who were either employees of the plant or qualified individuals contracted by the plant. Bord Bia have relaunched the PQA scheme (revised to comply with EN Standard 45011) in 2007 with farm inspections to be carried out by independent auditors.

Feile Bia is an initiative by Bord Bia to encourage restaurants, hotels and other foodservice outlets to source their meat and eggs from suppliers approved under recognised Quality Assurance Schemes, or from small scale suppliers with appropriate regulatory approval, including butchers. Products in the programme include beef, lamb, pork, bacon, chicken and eggs. Now in its sixth year, Féile Bia has almost 1,500 participants across Ireland.

Participating outlets display Féile Bia outdoor plaque and window stickers.

28.2. Retail chain QA

Some retail chains especially UK based have introduced their own QA schemes which tend to require compliance with UK national legislation plus some additional requirements introduced by the retailer. Wholesaler supplying pigmeat to processors who supply these retail groups may carry out similar audits.

The existence of several QA schemes results in increased compliance and monitoring costs at both farm and factory level which is difficult to justify.

29. Pig industry representation

29.1. Irish Farmers Association

The Pigs and Pigmeat Committee (PPC) of the Irish Farmers Association (IFA) is the representative body which lobbies politicians and regulatory agencies on behalf of pig producers. The PPC also acts as a sounding board for regulatory initiatives and negotiates with pigmeat processing plants and feed companies on prices for pigmeat and feed.

The IFA divides the country into 10 regional committees each of which sends representatives to the National Pigs and Pigmeat Committee. The chairman of

the PPC represents the interests of the pig sector on the IFA National Committee. The PPC members elect a smaller management committee to implement policy.

The large number of regional committees is a relic of when there was a greater spread of pig units throughout the country. The situation today is different due to the reduction in the number of pig units in certain areas. The pig population in Ireland is roughly divided in four regions (1) Cavan, North and North East, (2) South East, (3) South West and (4) Midlands and West. A new system of c. four regional committees would lead to a more efficient and streamlined operation while still allowing sufficient producer representation from each region. The regional committees could then elect 12-14 members to form the national committee. This reduced size would eliminate the need for a management committee thereby simplifying lines of communication from grassroots to national committee and producing a more efficient and dynamic group overall.

The success or otherwise of a lobby group will be dictated by the support of its members. Pig producers in Ireland are a numerically small group and therefore the IFA pigs committee must be able to utilize the support of all producers in order to be able to have its voice heard at national level. If the producers fail to provide this financial and physical support then the industry's voice and concerns will not be heard over the competing issues and agendas of other parties. Strong support will lead to a strong voice thereby benefiting all in the industry, weak support will lead to little or no voice, benefiting nobody and weakening the industry.

Communication channels need to be improved between the PPC and producers. Streamlining the committee system would help but there also needs to be regular updates by way of monthly or quarterly newsletter. This would keep producers informed of new issues or the progress of current issues and would also allow more feedback from the producers on current issues and lead to more informed debate at the regional meetings. Greater use of electronic media would facilitate contact and greatly reduce cost.

Attendance at local producer meetings is poor and might be improved by combining technical presentations with the "political" business.

29.2. Funding of producer representation

The PPC of the IFA is at present funded by a voluntary levy on pig sales. It is understood that the level of collection is well below the theoretical income. If pig producers wish to have an effective lobby they must be prepared to fund this either in the form of permanent staff or part time staff or to have a pool of money to hire outside expertise when required.

At €100 per pig sale price the theoretical yield of this levy on 2.6 million pigs slaughtered in the Republic is €390,000. Extension of the levy to live exports would yield an additional €70,000. A half-hearted funding measure will continue to leave pig producers feeling underrepresented.

A part-time executive secretary (shared as at present with the poultry sector) can only be expected to service the PPC and carry out routine administration and organisation. The provision of technical input needs to be acquired from reliable external sources. The lessons of the Nitrates Directive must not be forgotten.

29.3. Pigmeat processor representation

The pigmeat processor organisation is the Irish Association of Pigmeat Processors (IAPP) which is a subsidiary of the Irish Business and Employers Confederation (IBEC) which claims to represent over 7,000 member businesses and organisations from all sectors and of all sizes and is the national voice of Irish business and employers. With the exit of some meat processors from pig slaughtering, IAPP now represents only three of the larger slaughter plants and two firms representing under 70% of the weekly kill. This reduces its effectiveness in influencing policy and in being a united voice for the pigmeat industry.

The absence of an organisation to represent the other processors is a severe constraint on the implementation of programmes to improve pigmeat quality and food safety. There is an urgent need for IAPP to recruit to its membership the smaller slaughterers and the secondary pigmeat processors.

30. Government agencies impacting on the pig sector

There is great concern among pig producers and allied sectors that regulations tend to respond to pressure groups and current "fads" rather than being science based. Examples include some regulations in animal welfare, feed supply such as GM ingredients and environment. It is vital if stakeholders are to "buy into" regulations that the science behind the regulations be robust. The pig production sector can also play a part in this by being well briefed on emerging issues and engaging in constructive dialogue with regulators.

30.1. Department of Agriculture and Food (DAFF)

DAFF is responsible for:

- overseeing grading of pig carcasses,
- disease control,
- some aspects of food safety,
- animal health,
- animal welfare,
- feed regulation and
- with DOEHLG in environmental policy.

It also influences policy in relation to pigmeat by grant aid to the processing sector and recently to manure management and sow housing.

30.2. Department of Environment, Heritage and Local Government (DOEHLG) / Environmental Protection Agency (EPA) / Local Authorities

About 65% of the national sow herd is in units of size above the threshold for Integrated Pollution Prevention and Control (IPPC) licensing. This is high by EU standards. Relations between pig producers and the EPA have been difficult with disputes over the amount of information on farms of customers for manure which should be on files accessible to the public.

DOEHLG has as its main function (as it impacts on pig production) – the protection of water quality and this function is administered locally by County Councils. DOEHLG had a prominent role in the formulation of the Nitrates Action Plan (NAP).

The implementation of the Nitrates Action Plan (SI 378) and its application to all farms means that some of the concerns of the EPA in relation to manure application to land could be regulated under the NAP. This could serve as the basis for the resolutions of issues in dispute between EPA and IFA.

30.3. Bord Bia

Bord Bia has an active role in promotion of pigmeat on the home an export market and assistance to firms wishing to export pigmeat.

30.4. Enterprise Ireland

Enterprise Ireland has an active programme aimed at improving technical and financial management of pigmeat processing plants.

30.5. Teagasc

Teagasc is the body charged by the government with responsibility for research and development in pig production. The Teagasc pig service offers research, advice and training within a unified management unit. See sections 21.

30.6. Food Safety Authority of Ireland (FSAI)

The mission statement of the FSAI is as follows:

"Our mission is to protect consumers' health and consumers' interests by ensuring that food consumed, distributed, marketed or produced in the state meets the highest standards of food safety and hygiene"

30.7. Health and Safety Authority

The Health and Safety Authority (HSA) is the body with responsibility for regulation of health and safety in the workplace. HAS carries out inspections/audits of workplaces.

Pig producers are required by law to have a Safety Statement which details the risks to health and safety in the workplace and the steps taken to mitigate such risks.

31. SWOT analysis of Irish Pig Industry

31.1. Strengths

- The production sector consists of a committed group of existing pig producers
- The vast majority are professional, full time, specialist producers
- Unit managers are well educated and have - management training
- Units are labour efficient with a high level of mechanisation and automation
- Units produce to the Bord Bia quality assured standard
- Producers have access to good technical backup (advisers, vets)
- large units provide significant economies of scale
- Because of its island status Ireland has the potential to remain free of serious pig disease
- The density of pig production is very low
- Ireland is close to the substantial and increasing large UK market
- The health status of national herd is good
- Internationally Irish producers are competitive on production costs

31.2. Weaknesses

- There is increased dependence on inexperienced labour .
- There is no formal training available for staff
- Technical efficiency is declining vis-a-vis other EU producers
- Feed costs are higher compared to other European countries
- There is a lack of political clout (within farm organisations and nationally)
- The health status of the national herd is declining as new health problems arise
- There is considerable uncertainty regarding slaughtering plants and capacity
- Lack of transparency in pricing of pigmeat and feed are ongoing issues
- The size of the national herd as percentage of EU 25 is small
- Lack of investment in upgrading of housing and facilities means efficiency levels are being reduced
- The return on investment has been low
- There is a gradual decline in numbers in national herd
- There is also a decline in number of units

- The limited pool of genetics is related to the small national herd
- The industry has a PR deficit – a poor image
- The carcass grading system lacks credibility

31.3. Opportunities

- The high per capita consumption in the home market provides a good base
- There is some scope to produce heavier carcasses
- Proximity to the UK market where home supplies have fallen dramatically
- There are employment opportunities for part time farmers on pig units
- Contract finishing of pigs may be a viable option for farmers
- Grants for Farm Waste Management and loose housing of sows are currently available
- The traceability of pigmeat is excellent and production is to known production standards
- The image of the industry can be improved
- The good image of "green Ireland", "food island is an asset

31.4. Threats

- Herd health problems such as PMWS, PRRS, etc are serious issues
- Environmental legislation (planning, Water Framework, IPPC, Kyoto, Gothenburg Protocol, Nitrates) are significant constraints
- Welfare legislation poses challenges before 2013
- Energy costs are increasing
- There is a considerable risk of boar taint in heavy carcasses
- Imports of pigmeat are no longer insignificant
- The cost of labour is increasing
- The increased urbanisation of rural Ireland
- REPS scheme often operates as a disincentive to use of pig manure as a fertiliser
- The lack of formal training opportunities for staff is likely to lead to reduced efficiencies on units

32. Implementation programme for development plan

Recc. No.	Producers	Slaughter plants	Bord Bia	Teagasc	EPA	DAFF	DOEHLG	Feed industry
A.1					*	*	*	
A.2	*	*		*				*
B.1	*				*	*	*	
B.2	*				*	*	*	
B.3	*					*	*	
B.4	*						*	
B.5						*	*	
B.6	*			*	*	*	*	
C.1	*			*				
C.2	*			*				
C.3	*							*
C.4	*							*
C.5	*							
C.6	*							
C.7	*							
C.8	*							
C.9	*							
C.10	*							
C. 11	*							
C. 12	*					*		
D1	*	*						
D2	*	*						
D3	*	*						
D4	*	*		*				
D5		*		*				
D6	*	*						
E1	*							
E2	*							
E3	*							
E4	*			*				
E5	*	*						

Implementation Programme (continued)

Recc. No.	Producers	Slaughter plants	Bord Bia	Teagasc	EPA	DAFF	DOEHLG	Feed industry
F1	*					*		
F2						*		
F3	*					*		
F4	*					*		
F5						*		
F6	*					*		
F7		*				*		
F8		*		*		*		
F9						*		
F10						*		
G1	*			*				*
G2	*			*				*
G3	*							*
G4								*
G5								*
G6								*
H1	*	*		*				*
H2	*			*				
H3		*		*				
H4				*				
H5	*			*				
H6	*			*	*	*	*	
I1	*			*				
I2				*				
I3				*				
I4				*				
J1			*					
J2			*					
K1	*					*		
K2	*	*				*		

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34. Appendices

34.1. Appendix 1. Membership of project team

The project was carried out by the advisory and research staff of the Teagasc Pig Production Development Unit, namely:

- Brendan Lynch
- Michael Martin
- Laura Boyle
- Ciaran Carroll
- Seamas Clarke
- Ger McCutcheon
- Peadar Lawlor
- Michael McKeon
- Karen O'Connell

Appendix 2. Pig population (December census) and pig output in Ireland 1980 to 2005

	No sows (December)	Total no pigs (December)	Output (million head)	Output value (million Euro)	Output as % GAO
1980	103	1031	2.4	165	7.6
1981	107	1027	2.2	190	7.5
1982	110	1081	2.2	213	7.3
1983	108	1053	2.3	220	6.8
1984	105	1020	2.2	207	5.7
1985	103	994	2.0	192	5.5
1986	100	980	2.1	185	5.4
1987	99	960	2.2	184	5.0
1988	106	1015	2.2	176	4.4
1989	121	1110	2.3	225	5.2
1990	136	1249	2.5	237	5.1
1991	146	1346	2.6	242	5.3
1992	158	1423	2.8	280	5.8
1993	154	1487	3.0	258	5.1
1994	148	1498	3.0	265	5.4
1995	158	1542	3.1	295	5.7
1996	165	1665		357	6.9
1997	175	1717		337	7.1
1998	170	1801		283	6.0
1999	171	1763		251	5.4
2000	167	1732		297	6.1
2001	169	1763		345	6.8
2002	165	1781		301	6.4
2003	158	1732		283	5.8
2004	158	1758			
2005	156	1678			

Source: CSO. Note the methodology for calculating the value of output was changed in 990

Appendix 3. Pig and Feed Prices and Margin over Feed Cost per kg Dead Weight. 1991-2006

Year	*Average Finisher Price c/kg dead*	*Composite Feed Price €/tonne*	*Feed Cost c/kg dead weight*	*Margin Over Feed c/kg dead Weight*
1991	138	239	97	42
1992	148	242	97	51
1993	128	237	93	35
1994	128	233	90	37
1995	143	226	86	57
1996	164	238	92	72
1997	143	231	88	55
1998	114	216	81	33
1999	102	202	76	26
2000	130	207	80	50
2001	148	220	84	65
2002	130	220	83	49
2003	126	217	82	43
2004	137	226	86	42
2005	135	208	80	54
2006	140	212	83	57

Appendix 4. Density of pigs in Ireland by county and contribution of pigs and poultry to Organic Nitrogen loading

	Area Farmed 000 ha	All Pigs	Breeding Pigs	Pig/100 ha	Sows / 100ha	Sows / 100ha tillage	ON load, kg/ha	Pigs as % ON	Pigs + Poultry as % ON
Ireland	4443	1722	176.85	38.8	4.0	44.1	106	3.1	4.1
Leinster	1346	484	48.23	36.0	3.6	19.0	108	2.7	3.0
Carlow	71.9	20.8	2.3	28.9	3.2	11.7	105	2.5	2.6
Dublin	37.7	0	0.01	0.0	0.0	0.1	58	0.0	0.3
Kildare	112.5	27.8	3.81	24.7	3.4	12.9	85	3.3	3.6
Kilkenny	160.5	60.3	5.91	37.6	3.7	26.3	130	2.3	2.3
Laois	119.9	42.7	4.08	35.6	3.4	21.8	116	2.4	2.4
Longford	73.8	72.0	7.69	98.0	10.4	854.4	107	7.9	8.0
Louth	62	17.4	1.03	28.1	1.7	4.7	94	1.5	2.9
Meath	179.5	37.8	3.80	21.1	2.1	11.8	113	1.5	2.2
Offaly	121.4	54.0	5.55	44.5	4.6	47.9	118	3.3	3.3
Westmeath	120	42.0	3.71	35.0	3.1	64.0	105	2.4	2.5
Wexford	185	66.7	6.50	36.1	3.5	10.9	105	2.8	3.0
Wicklow	101.7	26.3	2.00	25.9	2.0	14.3	111	1.5	1.6
Munster	1657	715.8	73.88	43.2	4.5	63.1	117	3.1	4.0
Clare	210.5	15.1	1.55	7.2	0.7	73.8	85	0.7	0.7
Cork	533.8	364.1	38.49	68.2	7.2	57.6	128	4.7	5.2
Kerry	278.2	50.2	4.97	18.0	1.8	99.4	95	1.6	1.9
Limerick	202	55.5	5.95	27.5	2.9	212.5	128	1.9	4.9
Tipp N	149.4	45.4	4.53	30.4	3.0	36.8	122	2.0	2.1
Tipp S	159.1	97	9.83	61.0	6.2	63.0	132	3.9	3.9
Tipperary	308.5								
Waterford	124.4	88.5	8.56	71.1	6.9	56.3	135	4.2	6.5

Appendix 4. (continued). Density of pigs in Ireland by county and contribution of pigs and poultry to Organic Nitrogen loading

	Area Farmed	All Pigs	Breding Pigs	Pig/100 ha	Sows / 100ha	Sows / 100ha tillage	ON load, kg/ha	Pigs as % ON	Pigs + Poultry as % ON
Connaught	971	68.2	7.31	7.0	0.8	48.1	85	0.7	1.0
Galway	335.8	7.8	0.87	2.3	0.3	11.4	94	0.2	0.4
Leitrim	91.5	7.4	1.18	8.1	1.3	236.0	64	1.6	1.9
Mayo	274.2	25.2	2.52	9.2	0.9	64.6	80	0.9	1.6
Roscommon	159.5	24.4	2.4	15.3	1.5	126.3	91	1.3	1.4
Sligo	110.3	3.4	0.33	3.1	0.3	25.4	79	0.3	0.3
Ulster	469	454	47.44	96.8	10.1	334.1	106	7.9	12.9
Cavan	138.3	374.6	39.52	270.9	28.6	1881.9	133	17.8	19.3
Donegal	230.6	39.4	3.91	17.1	1.7	38.0	69	2.0	2.1
Monaghan	99.6	40.1	4.01	40.3	4.0	222.8	153	2.2	16.4
Max	533.8	374.6	39.52	270.9	28.6	1881.9	153	17.8	19.3
Min	37.7	0	0.01	0.0	0.0	0.1	58	0.0	0.3

Appendix 5. Written submissions and meetings

The following individuals and organisation made oral or written submissions. Their contribution is gratefully acknowledged:

1. An Bord Bia
2. Ballyburden Meats - Brian Walsh
3. Bartlett, Mary-Anne, CIWF
4. Beattie, Violet, Pig Production Development Committee, N. Ireland
5. Ted Carty, Carty Meats, Athlone
6. Cavan Co. Council
7. Crowley, John, Agricultural consultant, Bandon
8. Dawn Meats
9. Douglas, G. (PIC Ireland)
10. Dunne, John, DSM
11. Ennis, Michael, feed industry consultant
12. Enterprise Ireland
13. Environmental Protection Agency
14. Glanbia
15. Glenaine Foods, David Mc Grath
16. Hanrahan, Tom, Kilworth
17. Irish Farmers Association
18. Irish Grain and Feed Association
19. Kavanagh, Noel, MRCVS
20. Kelliher, Denis, MRCVS
21. Kerry, Joe, Meat Technology, UCC
22. Laois Co. Council
23. McCarren, Andrew, Cavan
24. National Co-op Pig Producers (NCPP)
25. Nolan, Ned, Hermitage AI
26. Nutec – SCA
27. O'Sullivan, John, Meat Industry Consultant
28. RLS Pig Group, Roscommon
29. Slevin, Olivia, Olhausens
30. Spillane, Paul, MRCVS
31. Teagasc, Ashtown Food Research Centre
32. Tipperary South Co. Council
33. Tipperary North Co. Council
34. Focus group, Moorepark 5/12/2006 (Rory O'Brien, Conor O'Brien, Phillip O'Brien, Jimmy O'Brien, Owen O'Brien, Jimmy

Foran, James Foran, Tom Hanrahan, Mike Sweeney, Mike McEniry, Jim McGrath, Pat O'Keeffe, Gerry Douglas)

35. Focus group, Cavan January 22, 2007 (Daniel Fay, Tony Fay, John Kiernan, Edward Moore, Luke Bogue, Damien Grimes, Michael Caffrey, John Higgins, Eamon Briody, Killian Tully, Richard Allison, Ronnie Kells, Con McEnroe, Seamus Smith, Matt Cusack)
36. Focus group, Tullamore January 23, 2007 (John Hynes, Richard and Rose Fryday, Matty Moore, Brian Alwell, Roy Gallie, Ber Gilsenan, John Murphy, Cormac Minnock, Nicholas Molloy, Sean Brady
37. Focus group, Kilkenny January 24, 2007 (Michael O Shea, Patrick Moore, Billy Moore, Michael O Neill, James Power, Tommy Norton, Richie Norton, Dickie Norton, Tim Cullinan, Seamus Kirwan, Robert Dowley, Michael O Shea and Paul Tully)
38. Focus group, Bandon January 30, 2007 (Raymond Moloney, Sean Hales, Jerry Murphy, Margaret Murphy, Jerry O'Brien, Oliver O'Sullivan, Jim McCarthy, Tom Moyles, Henry Sweetnam, Leo Meade, Jerome O'Leary, Eugene Riordan, Padraig McCarthy, James Nyhan, James Ronan, Sean O'Mahony, John Ryan, Tim Ryan, Don French, Dick Kingston, Padraig O'Donoghue, Paul Murphy)