

Teagasc Pig Research, Advisory, Education and Training Programme 2016-2020

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Teagasc Pig Development Department



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Teagasc Pig Research, Advisory, Education and Training Programme 2016-2020

A significant goal set out in the Teagasc Statement of Strategy is to support sustainable farming and the environment. Teagasc's Mission is to support science-based innovation in the agri-food sector and wider bioeconomy so as to underpin profitability, competitiveness and sustainability. The Teagasc Pig Development Department aims to fulfil this mission by providing research, advice and education across a range of important issues.

Our vision is to increase profitability in the pig sector by producing environmentally sustainable and welfare friendly pigmeat to the highest safety and quality standards.

Pig sector profitability is largely determined by input and output prices. InterPig results (Table 1) show that the costs of production are higher in Ireland than most European pig producing countries. The largest single input cost is feed (c.70% of total production cost). In 2014 feed cost per kg dead weight was ~17c higher in Ireland than the average for main EU pig producing countries (Denmark, The Netherlands, France, Germany and Spain). The focus on herd performance analysis/benchmarking and dissemination of research findings in order to reduce costs (especially feed) and improve profitability will ensure delivery of an excellent programme for pig producers.

Table 1: Total production costs for selected countries in cent per kg carcase						
	Denmark	France	Germany	Netherlands	Spain	Ireland
Feed	94	98	105	94	104	116
Total other variable costs	26	25	31	34	20	24
Total Fixed costs	34	37	38	36	37	31
TOTAL	154	160	174	164	161	171

Source: 2014 Interpig Report

Targets

The Irish pig sector must be able to compete in the international market if it is to survive, prosper and develop. At present, we have higher feed prices and feed costs than other EU countries and we need to reduce these if we are to be sustainable.

A target of producing 27 pigs per sow per year, and a feed conversion from weaning to sale of 2.4 are reasonable goals for the sector to achieve by 2020 (Table 2). These improvements would result in a six cent reduction in feed costs per kg dead weight.

Table 2: Current & Target Production Figures					
	2012	2014	2020	2020	2020
	Average	Average	Average	Top 25%	Top 10%
Pigs/Sow/Year	24.5	25.3	27	28.5	30
Weaning to Sale FCE	2.46	2.49	2.4	2.3	2.25

The research and knowledge transfer programme being delivered by Teagasc can help realise and monitor these goals. While these targets are physical targets, it is imperative that achieving them translates into economic benefits from reduced feed and non-feed production costs. The Teagasc Pig Development Department research programme covers a range of areas including nutrition and management, sow productivity, animal health and welfare, environment and food safety. The programme is closely linked with the research programmes in Irish and overseas universities through location/supervision of students and jointly funded projects.

Teagasc has committed over €3.5 million to the development of a new state of the art National Pig Research & Food Test Facility at Moorepark. Independent applied research will be undertaken by a strong research team at this facility, as well as on commercial pig farms around Ireland. Pig producers showed their commitment to the on-going research and knowledge transfer programme being delivered by Teagasc by signing up to the Teagasc/IFA Joint Programme (JP) in May 2013. Previous studies have shown up to 25:1 return on investment for pig research programmes, i.e. for every €1 invested in research there was a €25 return to the producers from adopting the research findings. Thus, the investment made by producers via the JP will return almost €9 million per annum.

As a result of funding provided via the JP levy Teagasc have appointed three Specialist Pig Development Officers, two Research Officers and a Research Technician. Along with existing staff these personnel will deliver an agreed pig research, knowledge transfer and education programme.

Summary of Key Significant Initiatives

Research

- Investigate formulation systems based on Net Energy(NE)/Standard Ileal Digestible Amino Acids (SID AA) and their main advantages under Irish production conditions
- Regular publication of standardised Moorepark diets, adjusted to incorporate the use of alternative ingredients
- Establish guidelines on the optimum use of wet feed systems
- Investigate nutrition and management practices to improve methods of gilt development
- Investigate link between respiratory disease, performance, welfare and antimicrobial use
- Terminal sire evaluation using different genetic terminal sources

Knowledge Transfer

- Increase numbers participating in ePM PigSys herd recording (to 100,000 sows) and investigate the potential to target farms with specific issues and link them to research projects
- Develop regional Discussion Groups
- Monthly monitor of pig & compound feed prices, plus feed cost model & guide price for home millers
- Pig Research Dissemination and continuation of Annual Research Dissemination Day
- Use of research findings to further develop feed formulations (*best cost & low cost*) for producers, incorporating the use of alternative ingredients
- Use the ePM database to research and develop an Economic Model to allow economic analysis of pig production technologies

Education

- Continue existing Level 5 pig courses and develop a Professional Diploma in Pig Farm Management
- Appoint a Course Coordinator to oversee all aspects of pig education
- Publication of Pig Management Manual

Research

Cost of production is a key factor in determining the cost competitiveness of Irish pig meat both in competing with imports on the home market and with other pig meat exporting countries on export markets. Feed represents about 70% of pig production costs as reported in PigSys/eProfit Monitor (ePM) recorded herds. Thus it is important that Irish feed costs are competitive with those of our international competitors. InterPig 2014 results show that the feed cost per kg dead weight was ~17c higher in Ireland than the average for main EU pig producing countries (Denmark, The Netherlands, France, Germany and Spain). Factors associated with this cost gap include higher transport costs for ingredients, feed formulation differences, diet specifications used & efficiency of feed utilisation and feed credit. Feed formulation, efficiency of feed utilisation, and diet specifications are areas that we have control over and should be targeted to help reduce costs. Research on nutrition and management strategies to further improve feed efficiency and growth rates (*e.g. investigation of current feeding strategies, use of the Net Energy system for diet formulation, use of less expensive diets, alternative ingredients, slaughter weights*) will form a significant part of the PDD research programme. It should be possible **to target a six cent reduction in feed costs per kg dead weight.**

- Formulating diets based on net energy (NE) and standard ileal digestible (SID) amino acids (AA) and feed processing and the use of feed enzymes have great potential to reduce costs. Better formulation and the use of alternative ingredients, including enzymes should result in significant savings.
- More than 70% of the feed cost is incurred in the finisher period so research directed towards improving feed efficiency and reducing costs during this period is crucial. Additionally, nutrition of sows and early in the pig's life can have a huge impact on lifetime growth, feed efficiency and carcass quality.
- Advances in the genetics of the Irish sow herd are largely responsible for the dramatic increases in numbers of piglets born alive in the last 10 years. However, there has been a concomitant increase in the number of small and weak piglets produced. These problems culminate in piglets dying at a younger age, or reaching finishing weight at a slower rate.
- Herd Health and welfare have an important impact on production efficiency and can be a constraint for exports. Ideally pigmeat of the future will be produced in low disease, high welfare herds where the use of antibiotics is minimal and production efficiency is optimised.
- Having reviewed the research programme in relation to the needs of the industry, Teagasc is proposing to address a number of key issues in an enhanced research programme on pig nutrition & management, sow productivity, health & welfare and genetics. This is in addition to a number of research initiatives & projects that were agreed at the outset of the JP and which are currently ongoing.

Nutrition

- Diet formulation systems based on Net Energy/ SID AA and their main advantages under Irish production conditions will be researched. This will include the use of by-products and alternative ingredients that may be used to reduce feed costs. The project will gather information on the ingredients and nutrients of the diets used in Ireland, assess the effect that NE system and digestible AA formulation would have on Irish pig diets, compare the French and Dutch NE systems in Irish conditions depending on the ingredients available and discuss with industry which better suits the needs of Irish pig production. It will conduct trials to quantify the impact of NE and digestible AA use in simple and complex (least cost) diets and conduct a cost benefit analysis. A Net Energy workshop for feed companies/nutritionists will help move the industry forward to better formulation criteria that will save pig producers money (estimated saving €2 per tonne). Project ends 2017.
- Using records from the ePM PigSys database to identify farms with poor Feed Conversion Efficiency (FCE), evaluate their feed and management practices and develop strategies to improve the FCE and reduce their feed costs (*FeedStrats*, ends 2016). This project will also focus on feed specifications and diet analysis, thus increasing the necessity for feed compounders to be more open about what ingredients are being used in pig diets. Collaboration with the Specialist Pig Development Officers in obtaining feed samples and specifications will strengthen this project, ensuring that the Specialists and their farmer clients keep focussed on this critical area. The project will quantify the effect of selected feeding practices on efficiency and propose new feeding practices that would improve feed efficiency. A cost/benefit analysis of the different feeding practices will be conducted. A 5% improvement in FCE would result in a 5 cent/kg dead weight (€4 per pig) saving to producers.
- Regular publication of standardised Moorepark diets, adjusted to incorporate the use of alternative ingredients.
- Wet Feeding; up to 70% of Irish pigs are liquid fed. Many farms still use excessive water / meal ratios, negatively impacting on the feed efficiency of pigs and increasing manure volume. A state of the art liquid feeding system will be installed in Moorepark and it is proposed to use this to establish guidelines for producers on the optimum use of such systems. Optimum water / meal ratios, feeding curves and timing of feed splits will be determined and comparison of an optimised liquid feeding operation with meal and dry pellets in feed hoppers and single space wet/dry feeders will be researched. A 5% improvement in FCE would result in a 5 cent/kg dead weight (€4 per pig) saving to producers.
- Feed enzymes offer the possibility to make greater use of common ingredients and may allow greater use of alternative feed ingredients and by-products. This research will seek to improve nutrient availability

from fibrous ingredients, to increase protein digestibility and possibly inactivate anti-nutritional factors. A 5% improvement in FCE would result in a 5 cent/kg dead weight saving to producers.

- “A whole systems approach to optimising feed efficiency and reducing the ecological footprint of Monogastrics” (ECO-FCE) is a Pan-European collaborative project which is co-financed by the European Commission. Through better understanding of the interactions between animal genetics, gut structure and function, the microbial population of the gut and the attributes of feed, ECO-FCE will propose strategies to improve feed use efficiency in pigs whilst also reducing the ecological footprint of pig production. A 5% improvement in FCE would result in a €4 per pig saving to producers (ends 2017).

Sow Productivity

- Gilt Rearing; identify improved methods of gilt rearing, so that nutrition and management is optimised to reduce limb problems, and improve mammary development. This will not only have positive outcomes for the gilt, but also for the efficiency of the piglets produced. The new herd at Moorepark provides an ideal opportunity to carry out this research.
- Investigate methods to improve health, welfare and survival outcomes for small and weak piglets. Methods will include using dietary supplements in dry sow feed, use of nurse sows, provision of energy supplements and use of rescue decks. This project targets an increase of 1.3 extra liveborn piglets / litter increasing the Irish average to 13.6. The project also aims to increase viability/vitality of piglets. The benefits to sow output could be 2.9 pigs/sow/year. On a 500 sowfarm, this would increase net profit by €35,650/annum. This has the potential to increase output at farm gate by 432,100 pigs (12% increase on 2011) and net profit of the national herd by ~€10.6m/annum. Employment in the sector is currently estimated to be ~7,500 people. The increased output could create an estimated additional 860 jobs in the sector with all additional pigs produced exported (OPTIPIG, ends 2017).

Health & Welfare

- Investigate the relationship between respiratory disease, performance, welfare and antimicrobial use. Additionally this project will develop novel diagnostic methods for respiratory disease, and identify risk factors for its development (PathSurvPigs, ends 2018). Estimated improvements would result in savings of €3.20 per pig.
- Investigate methods of reducing the risk of tail biting and docking using natural substances such as wood and compressed straw. Artificial alternatives (e.g. rubber chew toys) will also be compared with natural products, or used in combination. Dietary adjustments will also be investigated. Research at Moorepark has shown a cost of €1.70 per pig due to condemnations and lost carcase weight as a result of tail biting

(Entail, ends 2018).

- Investigate the link between production diseases, poor welfare and antimicrobial resistance, including social science work to investigate attitudes around antibiotic usage, and practical strategies to reduce their use. Reduction in antimicrobial usage will be legislated for in the near future. Any improvements the pig sector can make towards this will have enormous societal benefits (WELPIG, ends 2017).
- Evaluate and improve the biosecurity status of pig farms throughout Ireland and examine the variability between national and EU counterparts. Results to date show a 12% improvement in profitability for farms who adopt recommendations (BIOCHECK, ends 2016).

Genetics

- A terminal sire evaluation trial using different genetic sources with the progeny performance tested and dissected after slaughter. Previous work at Moorepark showed a €6 per pig benefit to producers.

Other Areas

Research will incorporate the use and investigation of SMART technology and precision livestock farming tools (*e.g. balance floors in farrowing rooms, thermal imaging*), and address legislative issues that affect pig farming. Such legislative areas include:

- **Environment:** Irish agriculture is responsible for 29.1% of the total greenhouse gas (GHG) emissions generated nationally (*pig sector produces ~2% of total agricultural GHG*). Environmental sustainability is an important component of any production system and is becoming important in the marketing of pig meat. Compliance with a number of European Union Directives will become mandatory for Irish pig producers, with particular relevance to ammonia and particulate matter emissions. This will have implications for house design, ventilation systems and slurry management on farms.
- **Animal Welfare:** coping with the ban on teeth clipping and tail docking, environmental enrichment, floor type/space, and loose farrowing systems. A ban on castration may have a positive impact for Ireland, as other EU countries may be forced to reduce slaughter weights.
- **Water Quality:** changes required to comply with the Water Framework directive, and coping with the end of transition period in relation to Nitrates regulations
- **Antibiotic Usage:** continued pressure to reduce usage, and investigate alternatives to antibiotics to help control pig diseases

Note: there are a number of other ongoing projects not included in this document (further details at http://www.teagasc.ie/publications/view_publication).

[aspx?PublicationID=3604](#)) Details available from relevant researcher.

Use of the ePM Database in applied research

The main data collection methods for performance and economics are the e-Profit Monitor (ePM) PigSys system and project-specific research questionnaires. With the ePM system, individual farms keep records which contribute to the Teagasc National Farm Database. This data is used to report annual performance of the national pig herd, currently representing more than 84,000 sows (56% of the national herd). This database is used to improve performance at individual farm level. However, there is further potential to target farms with specific issues and link them to specific research projects. The use of the ePM can contribute to a greatly enhanced applied research programme to improve the competitiveness of the sector. Some examples of this are:

- FeedStrats project discussed above.
- Research to examine if ante- and post-mortem lesion inspection can be linked back to pig performance at farm level (PIGWELFIND, ends 2016).
- Use the ePM database to research and develop an Economic Model for economic analysis of pig production technologies. Economic models should be applied to all research projects.

Advisory Service

Teagasc Specialist Pig Development Officers service pig producers from offices in Moorepark, Oak Park and Ballyhaise, providing an **independent** business and technology service, based on the analysis of herd performance data, feed costs and financial records and benchmarking these against industry averages using the Teagasc ePM system. This system provides clients and their advisor with up-to-date detailed information on the technical and financial performance of the herd and helps form the basis for the advisory service delivered to clients.

Data from participating herds is amalgamated annually to provide national information of the technical performance, costs of production and margins in the sector. This national database is the source of benchmarking targets such as average, top 25% and top 10% of herds selected on specific parameters. Herds participating in ePM/PigSys perform significantly better than non-participating herds (Martin, 2009). Increased participation in ePM is essential to the long-term viability of farms. The ePM provides essential information required to enable Ireland to actively and constructively participate in InterPig in which participant countries compare production efficiencies and costs.

The ePM system will be used to monitor progress on the targets outlined in this document, **27 pigs per sow per year, and a feed conversion from weaning to sale of 2.4 by 2019**, while focussing on the key performance indicator of

producing two tonnes of pigmeat from seven tonnes of feed.

Outside the farm gate profitability is significantly influenced by fluctuations in world ingredient prices. The industry is further exposed to price fluctuations by the necessity to import ingredients not grown domestically e.g. soyabean. Significant increased demand by new (bioethanol) and existing (Chinese) markets has resulted in increased global volatility. This volatility has attracted international hedge fund speculation which further exacerbates the feed ingredient supply-demand volatility. Due to Ireland's status as a pig feed ingredient importer (33% of total) and pigmeat exporter (65% of total) Teagasc recognise the importance of providing, timely, accurate, impartial market information on international feed ingredient and pigmeat market trends. Collaborations with economists in the Rural Economy & Development Programme (REDP) will enhance this knowledge and the service provided.

Technology transfer employed (*and some targets*) include:

- **ePM:** PigSys herd performance analysis (140 farms/year; 100,000 sows)
- **Farm visits:** duration 0.5 to 1 day depending on herd size (target 300/year)
- **Review of pig farm business operations:** including budget & cash flow programmes (50/year)
- **Office & telephone consultations:** time saving where farm visit not required
- **Email & text alerts:** monthly newsletters; website www.teagasc.ie/pigs
- **Discussion groups:** new initiative, currently seven groups, 70+ members (60,000 sows).
- **Workshops:** for farm staff & managers on a variety of relevant topics
- **Technical Articles:** e.g. IFJ, Farming Independent, Farmers monthly, Pig Progress Annual pig farmers' conference & research dissemination days; presentations at industry conferences
- **PDD stand at National events:** (Ploughing championship, Irish Pig Health Society Symposium)
- **Pig Management Manual:** to be finalised and published
- **Local radio:** farming programmes
- **Pig & feed prices:** monthly monitor of pig & compound feed prices, plus a guide price for home millers based on ingredient prices using a standard Moorepark diet.
- **Feed programmes:** PIGAP (manure management tool); housing accommodation calculator; depreciation calculator; compliance & legislation advice; scheme preparation; Bord Bia QAS

- Promotion of pig slurry as a valuable fertiliser and encouraging Advisors/ Agri- consultants to include it in their nutrient management.
- **Market Trends:** reviews & predictions on meat and grain markets, disseminated via Situations & Outlook Seminar, newsletters, email alerts, etc.
- **INTERPIG:** production and cost comparisons across EU & international countries
- **DAFM briefings:** Welfare, Salmonella, Grant schemes, health, nutrition
- **Liase with others:** IFA, DAFM, Banks, Feed Mills, Processors, Bord Bia, EPA, Local Authorities

Significant New Advisory Service Initiatives

- Increase the numbers participating in ePM PigSys herd recording & analysis and investigate the potential to target farms with specific issues and link them to research projects
- Develop regional Discussion Groups
- Monthly monitor of pig & compound feed prices, plus feed cost model & guide price for home millers based on ingredient prices using a standard Moorepark diet
- Use of research findings to further develop feed formulations (*best cost & low cost*) for producers, incorporating the use of alternative ingredients where available and suitable.
- Annual Pig Research Dissemination Day
- Use the ePM database to research and develop an Economic Model for economic analysis of pig production technologies.

Education

Skilled staff, 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 sector in the past. In conjunction with Ballyhaise and Clonakilty Agricultural colleges, Teagasc initiated a FETAC Level 6 course in 2009-2011. Since then over 80 students have been trained and upskilled in pig production. Changes made by QQI (*formerly FETAC*) resulted in changed course specifications and the current course (2013-2015) is at Level 5. There are 46 students attending this course. These courses help to ensure pig farm operatives are trained to the highest standards of animal husbandry. There is a need to develop a Pig Farm Managers course for those who wish to progress their careers in the pig sector, provided that additional personnel are provided to oversee it.

Initiatives to develop and improve education and technical standards throughout the pig industry in Ireland

- **QQI Level 5 Pig course:** ongoing (subject to demand)
- **Professional Diploma in Pig Farm Management:** aim to commence in 2016 (subject to demand); investigate accreditation
- **Introduction to pig production (Ag college module):** to expose the general agriculture students to the pig industry and career opportunities in the sector
- Appoint a Course Coordinator to oversee all aspects of pig education (Level 5 and manager's course) and who would also work to promote pig production as a career
- Publication of Pig Management Manual

Department Staff

Head of Department



Ciaran Carroll,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 025-42388 | Mob: 087-2462925
Email: ciaran.carroll@teagasc.ie

Knowledge Transfer Department



Gerard McCutcheon,
Teagasc, Oak Park, Carlow
Tel: 059-9183503 | Mob: 087-8303969
Email: gerard.mccutcheon@teagasc.ie



Michael McKeon,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 025-42259 | Mob: 087-6739178
Email: michael.mckeon@teagasc.ie



Dr. Amy Quinn,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 076-1112723 | Mob: 087-3779015
Email: amy.quinn@teagasc.ie



Shane Brady,
Teagasc, Ballyhaise, Co. Cavan
Tel: 049-4338642 | Mob: 087-3779014
Email: shane.brady@teagasc.ie



Emer McCrum,
Teagasc, Ballyhaise, Co. Cavan
Tel: 049-4338642 | Mob: 087-7940974
Email: emer.mccrum@teagasc.ie

Research Department



Dr. Peadar Lawlor,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 025-42217 | 086-8214671
Email: peadar.lawlor@teagasc.ie



Dr. Laura Boyle,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 025-42389 | Mob: 087-9295364
Email: laura.boyle@teagasc.ie



Dr. Keelin O'Driscoll,
Teagasc, Moorepark, Fermoy, Co. Cork
Tel: 025-42289
Email: keelin.odriscoll@teagasc.ie



Dr. Edgar Garcia Manzanilla,
Teagasc, Fermoy, Co. Cork
Tel: 076-1112299 | Mob: 087-9614454
Email: edgar.garciamanzanilla@teagasc.ie

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Notes

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Pig Development Department,
Animal & Grassland Research and Innovation Centre,
Teagasc,
Moorepark,
Fermoy,
Co. Cork

Tel : 353 (0)25 42457

Email: PigDepartment@teagasc.ie

www.teagasc.ie

