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College of Agriculture, Food & Rural Enterprise

The proceedings of the

Agri-Food and Biosciences Institute
Hillsborough

Wednesday 16th September 2009

Department of Agriculture and Rural Development
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ULSTER FARMERS' UNION
THE LAND FIRST

The proceedings of the
Northern Ireland Pig Event
AFBI Hillsborough
16th September 2009

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INDUSTRY SUPPORT BODIES

Preface

The Northern Ireland Pig Event 2009 follows on the success of the 2004 event. It has been jointly organised between AFBI Hillsborough, CAFRE and the UFU. This collaborative approach has helped us tailor the event to the needs of the industry.

At the Northern Ireland Pig Event 2009, presentations will report on recent research findings and will include a carcass dissection. A keynote presentation will be delivered by Mr Peter Best, the editor of the popular pig magazine 'Pig International'.

Due to biosecurity restrictions, it is not possible to tour the actual pig unit at Hillsborough but a slide show presentation will be on display to show producers the facilities and pigs on site and to highlight recent additions and alterations. There will also be an opportunity for producers to hear about the work AFBI is conducting on renewable energy opportunities and anaerobic digestion. There will be a comprehensive display area and visitors will be given an opportunity to discuss many issues relative to the industry and also participate in a pork-tasting exercise.

One of the main changes within the AFBI pig unit over the past five years has been the retirement of Mr Dennis Watt (Unit manager) and Mr Norman Morgan (Unit stockman). Jointly, these individuals gave 76 years of service to the unit at Hillsborough. Both individuals were excellent stockmen and we wish them a long and happy retirement. Mr Declan Armstrong is the new Pig Unit Manager. Declan was a scientific technician within the pig unit for over 10 years and therefore has a sound knowledge of pig production and factors affecting profitability.

Within the one forum, the Northern Ireland Pig Event 2009 provides a unique opportunity for pig producers to interact with all AFBI and DARD departments which play a role within the pig

industry. In addition, the support and levy bodies (UFU, UP&BF, PigRegen Ltd and NIGTA) will be present to address concerns and discuss important issues with producers.

Finally we would like to sincerely thank all participants at the Northern Ireland Pig Event 2009 for making the event unique and highly informative. The help and advice provided by AFBI corporate communications, in particular Chris Armour and Cliff Mason is recognised and appreciated.

We hope that everyone can take some information home that will make their pig enterprise more successful.

Northern Ireland Pig Event 2009 organising committee:

From left to right:
Elizabeth McCann (AFBI) Mark Hawe (CAFRE)
Declan Armstrong (AFBI) Elizabeth Magowan (AFBI)
Colin Smith (UFU) Liz Donnelly (CAFRE)

Introduction

Welcome to the Northern Ireland Pig Event 2009

This event aims to update the pig industry on research and technological advances over the past five years within an informal and informative forum. The involvement of our colleagues across DARD provides a unique opportunity for pig producers to gain much information within the one event. Furthermore, the presence of the UFU, UP&BF, PigRegen Ltd and NIGTA completes the range of organisations who are actively involved in addressing issues for the pig industry.

A new feature at the Northern Ireland Pig Event is a presentation from a renowned pig production commentator who will bring a European flavour to the event and inform the pig industry of opportunities to compete within a global market.

One major challenge facing the pig industry which has arisen in the past few years has been the cost of raw materials and energy. A key focus of research has therefore been optimising energy use efficiency and investigating the use of alternative feed ingredients. Optimising the use of feed nutrients and reducing the excretion of nitrogen and phosphorus also remains a key area of research.

It is recognised that in order to increase pork consumption, the meat and eating quality of pork should also be addressed. Recently, research has focussed on identifying key on-farm production factors affecting meat and eating quality.

The research is not possible without the support of our key funders which continue to be actively involved in the AFBI Hillsborough research programme.

I would like to take this opportunity to sincerely thank the following for their continued financial support:

- Department of Agriculture and Rural Development
- PigRegen Ltd
- Devenish Nutrition Ltd
- John Thompson and Sons Ltd
- Preferred Capital Management
- British Pig Executive

It is our objective that the Northern Ireland Pig Event 2009 will provide pig producers with an opportunity to discuss key issues and obtain information which will improve the profitability of the pig industry.

George McIlroy
Chief Executive Officer AFBI

CHAPTER 1

OVERVIEW OF THE NORTHERN IRELAND PIG INDUSTRY

The Northern Ireland pig industry - 2009

Production sector

Over the past few years sow numbers in Northern Ireland (NI) have hovered between 35,500 and 37,000 (DARD census results). Although there was a 4% reduction in sow numbers between June 2007 and June 2008, sow numbers have since increased. In December 2008 sow numbers were estimated at 36,500. Unit size continues to increase and the 25 largest businesses own almost 23,000 sows. In other words over 60% of sows in NI are owned by just 25 businesses.

Processing sector

The processing sector in NI has also undergone changes in recent years. There are now four factories slaughtering pigs – Vion Pork, Dunbia (Ballymena), Foyle Meats and William Grant.

In 2008 almost 1.29 million pigs were slaughtered in NI factories. Approximately 35% of pigs slaughtered were imported from the Republic of Ireland. For the first six months of 2009, 640,000 pigs were slaughtered, 34% of which were imported.

Pig performance

There has been a gradual increase in the overall performance of NI pig herds. For the 2007/2008 year, benchmarked units produced 1.63 tonnes of pigmeat per sow per year. The top 25% of benchmarked units produced 1.86 tonnes, with the top unit producing almost 2 tonnes of pigmeat per sow.

An analysis of the breeding herd (8,300 sows) shows the average born alive per litter is 11.5, average weaned per litter 10.17, and pre-weaning mortality is 10.96%. Litters per sow per year for the analysed herds was 2.31, resulting in an average of 23.48 pigs weaned per sow per year.

The average slaughter weight continues to increase and for the six months up to June 2009, the average carcass weight was 82.6 kg. There has been a 4 kg increase in carcass weight since 2004 / 2005. Based on an average of 780,000 NI pigs slaughtered per year in local factories the increase in carcass weight has resulted in an extra 3,120 tonnes of pigmeat being produced annually by the local industry. For the first six months of this year 35,000 tonnes of pigmeat was produced by the local industry.

Challenges

Pig producers in NI have faced several challenges since the last NI Pig Event in 2004. These challenges have included the introduction of Post Weaning Multi Systemic Wasting Syndrome (PMWS), higher feed costs, food scares, environmental legislation and the need to improve overall productivity.

Responding to the challenges has resulted in positive changes to the industry. Changes have included a swing away from the traditional Landrace/Large White breeds to different terminal sires, the widespread use of the wasting vaccine, an increase in home milling and mixing and liquid feeding, the reduced use of the more expensive feeds, the use of lower protein rations and an increase in slurry storage on farms.

Continuing investment in buildings, new technologies and labour efficiency will ensure the industry can compete in the future.

For further information contact Liz Donnelly

The AFBI Hillsborough pig herd

AFBI Hillsborough pig unit

The unit was established on the present Minimal Disease site in the late 1960's and has been a self sustaining closed herd since formation. Replacement gilts and boars are reared on the unit and modern genetics are introduced solely by AI. The birth to bacon herd consists of 140 Landrace x Large White (F1) sows and a nucleus of pure Landrace sows from which replacements are bred. The purpose of the herd is for unbiased research but is run to commercial targets of productivity.

Batch farrowing

A three week batch farrowing system is in place with 20 sows typically per batch. This allows for a substantial pool of pigs to be drawn from for experimental trials and optimum usage of farrowing, weaning and finishing accommodation. Herd and health management tasks are worked around the key tasks of the 3 week production cycle which are :

Week 1 - Mating, Week 2 - Farrowing , Week 3 – Weaning.

A booklet detailing batch farrowing is available from AFBI and the practice can be discussed with the unit manager (Declan Armstrong) at any time .

Gilts

Replacement rate

Sows in parities 4-6 have been shown to be more productive than sows in parities 1-3 (35 pigs per sow over the three parities versus 32). Therefore, in order to maintain sow numbers and maximum production, the annual replacement rate does not exceed 40%, which ensures that the number of sows in parities 1-3 is not greater than 55% of the breeding herd.

Pre oestrus management

Dams are specifically selected to produce replacement gilts. Dams, with good milking ability, as indicated by the weaning

weight of their litters, good temperament and longevity are specifically identified and sired with Landrace genetics. At weaning prospective gilts are identified and at 10 weeks of age, selection is further refined, mainly depending on the growth rate of the gilt between weaning and 10 weeks of age. From 10 weeks of age the selected gilts are kept on solid floors where they are allocated generous pen space (1.65 m^2 per pig to 95 kg live weight and at least 2.8 m^2 per pig at first mating). When gilts are approaching 100 kg, they are inspected for good posture and leg strength, teat numbers and general growth rate. 'Rejects' are sent for slaughter. At 210 days of age (135 kg) the gilts move housing to bring them in close proximity to a boar.

During transfer the gilts are vaccinated against Parvo virus. In order to stimulate oestrus to synchronise their reproductive cycle with that of the batch farrowing herd, the gilts are moved to the presence of a boar on the Monday of a 'weaning week' and, during this week they are allowed into the same pen as the boar for approximately 15 minutes per day. The length and intensity of photoperiod are key factors for the onset of oestrus. The light intensity should be sufficient to read a newspaper and should be maintained for 12–16 hours per day. Employing these management practices results in approximately 80% of the AFBI gilts coming on heat within 10 days and 90% within 14 days.

Mating

Natural service of gilts does not occur until at least 240 days of age (140 kg) and showing their second heat, as the number of ova released significantly increases from first to second oestrus, therefore significantly increasing the numbers of pigs born per litter. A backfat depth at P_2 of 16–18 mm or condition score of 3.5 (on a 1-5 scale) is optimum at the time of mating.

Diet

The diet of the gilt is specifically designed (DE 13.2 MJ per kg, CP 13.7%), to supply extra minerals and vitamins to strengthen

the bone structure and encourage the deposition of fat in the developing gilt. *Ad libitum* feeding of this diet is offered from 65 kg until the gilt is mated, after which the diet is restricted to 2.2 kg per day for the remainder of the pregnancy. After 13 weeks of pregnancy gilts are vaccinated against Erysipelas, this vaccination also occurs at 13 weeks in all subsequent pregnancies. On farrowing the gilt enters the management of the main sow herd.

Sows and gilts

Post farrowing management

Sows and gilts are weighed, condition scored and measured for backfat depth at P_2 at transfer to farrowing accommodation one week pre-parturition. The majority of gilts and sows are allowed to farrow naturally, however those sows which do not farrow by Thursday are induced (providing they are within 24 hours of their expected farrow date). A high energy (DE 14 MJ per kg), high protein (CP 18%) lactation diet is offered as dry pellets from when the sows enter the farrowing accommodation until weaning.

It is aimed that over the lactation period (on average 29.4 days for gilts and 27.5 days for sows) gilts would consume 170 kg of feed and sows 200 kg of feed. During lactation gilts and sows are fed to appetite using the Stotfold feeding curve, i.e. 0.5 kg of feed is offered additionally each day from a starting point at farrowing of 3 kg up to a maximum of 10 kg. This allowance may increase up to 11 kg depending on litter size and body condition. The ration is offered through a hopper and is split over two feeds per day to encourage intake of feed and water.

At weaning, gilts normally have a condition score of approximately 2.5–3.0 (sows ~3–3.5) and the subsequent average days to service are 4.5. At AFBI, savings have been made on a cheaper gestation or dry sow diet in parities 2–6, with these savings invested in the lactation diet described above.

At weaning, sows and gilts are again measured for backfat depth at P_2, condition scored and weighed.

Since the last Pig Event in 2004, the farrowing accommodation has been refurbished. The heated forward creep areas have been retained as the piglet requires a very different environment to the sow. However, the farrowing crates that are now in place represent those more commonly used in Europe and can be seen in the pictures below. These farrowing crates can be adjusted according to the size of the sow and are designed to improve piglet survivability. This is currently being monitored.

One of the refurbished rooms in the farrowing accommodation

Weaning and artificial insemination

Piglets are weaned from sows at four weeks of age. On average 22.5 pigs are weaned per sow per year. The sows are transferred to pens with generous space allowance containing voluntary cubicles, which are in close proximity to the boar. Sows are placed in groups of four according to weight, i.e. four light sows, four heavy sows. All sows are offered 3.5 kg per day of a dry sow diet (DE 13.1 MJ per kg, CP 13.4%).

Heat is normally detected within three-four days with the sow standing rigid when pressure is applied to the back and the vulva appears red and swollen. Upon heat detection sows are artificially inseminated twice, using a foam tip catheter, at approximately 2–3 hours and 24 hours after heat detection.

During the AI procedure sows are temporarily enclosed in the cubicles and the boar is allowed into the passage in front of them to aid the sows receptiveness of the AI procedure.

Gestation

Sows stay in the voluntary cubicle pens for a further four weeks after insemination, being offered the dry sow ration described above according to body condition. After four weeks all sows are pregnancy tested using an ultrasonic scanner and transferred to the large dynamic group of approximately 40 sows where they are offered the dry sow ration, according to body condition via an electronic feeder. Space allowance in this dynamic group is always in excess of legislation (2.25 m^2 per sow). In this group housing, sows have access to boars to help with detection of repeats to service. Sows which repeat twice are culled. This maintains an extremely productive and efficient breeding herd.

Sows remain in this large dynamic group until one week prior to farrowing at which stage they are transferred to farrowing accommodation and offered a lactation diet (described above) at the same level as they were consuming the dry sow diet. At this stage sows are also medicated for worms and mange.

Pigs

Piglets

Since tail biting and injury to sows and other pigs has not been eradicated within the herd tail docking and teeth clipping is carried at birth or on day one. Navels and tails are sprayed with iodine to help prevent joint ill and an Iron injection is also given. Piglets are also routinely tattooed at this stage. Piglets are also individually weighed at birth or on day one and average approximately 1.6 kg. Heat lamps are used at farrowing behind the sow and one lamp is left on for two days post farrowing to reduce piglet mortality from overlying by the sow. From day 17 to weaning (day 28) a creep diet with a digestible energy value of 16.5 MJ per kg, CP of 22.5% and lysine content of 1.7% is

offered. At weaning all pigs are weighed again and vaccinated against pneumonia. During the suckling stage piglets have a heated creep area to lie in and are offered water via nipple drinkers.

Weaned pigs

At four weeks of age and with an average weight of 9.2 kg pigs are transferred to combined stage 1/stage 2 housing with fully slatted plastic flooring. On entry the temperature of the room is 28^{O}C. The temperature decreases daily by 0.5^{O}C to 19^{O}C at which it is maintained until pigs are 10 weeks old. Pigs are grouped in pens of 20 and offered pelleted feed through a multi-space feeder and water from two bowl drinkers. Their space allowance is 0.38 m^2 per pig and the pen contains environmental enrichment in the form of a suspended manilla rope, although this may change as it appears to be causing major problems when handling the slurry.

The following dietary regime is used between four and ten weeks of age:

28–38 days : Diet 1 (DE 16.5 MJ per kg, CP 22.5%, lysine 1.7%) offered until all pigs eat 3 kg each

39 days–7 weeks : Diet 2 (DE 16.0 MJ per kg, CP 21%, lysine 1.55%) offered until all pigs eat 6 kg each

7-10 weeks : Diet 3 (DE 14.0 MJ per kg CP 18.5%, lysine 1.2%)

Between weaning (four weeks) and 10 weeks of age, on average pigs grow at 480 g per day, consume 740 g per day of feed and have a feed conversion efficiency of 1.5.

Post weaned pigs on the AFBI herd

Growing / finishing pigs

At 10 weeks of age and on average 29.5 kg pigs are transferred to finishing accommodation remaining in their groups of 20. On entry the temperature of the room is 19^{O}C. Pigs are offered water and pelleted feed through two wet and dry single space feeders placed back to back. They are kept on fully slatted concrete flooring with a space allowance of 0.65 m^2 per pig. Again the pen is environmentally enriched by the presence of a suspended manilla rope. The same grower diet as above is offered for a further two weeks. A finishing diet (DE 13.5 MJ per kg, CP 16.5%, lysine 9.5%) is then offered from 12 weeks of age to finish. During the finishing period pigs have an average daily gain of 870 g per day, an average daily feed intake of 2180 g per day and a feed conversion efficiency of 2.52.

An 'all in all out' system is operated through weaning, growing and finishing, all pigs are sent for slaughter at a target weight of 100kg however pens are cleared during the third week to make room for the new batch of pigs entering. The average slaughter weight of pigs during January to June in 2009 was approximately 100 kg with a kill out of 76% and backfat depth (P_2) of 10.8 mm.

Finishing pigs on the AFBI herd

A key addition to the finishing unit facilities since the Pig Event in 2004 is a hard cast house capable of housing 80 finishing pigs across eight pens. This house has specialist research facilities as pigs are feed via electronic feeders. In addition there is a separate slurry tank for each pen so that nutrient analysis of the slurry can be made specific to the diet being offered to that pen of pigs. The electronic feeders allow for detailed feed intake and feed behaviour measurements of individual pigs to be taken on an ongoing basis. This house was jointly purchased between AFBI and Prefered Capital Management (PCM) and is a tremendous asset to the research programme and the industry as a whole.

Summary

We have found that the key to an efficient and profitable herd is recording, planning and setting targets as with any business. Without these, problem areas cannot be identified and subsequently improved upon.

For further information contact: Declan Armstrong or Elizabeth Magowan

No recording – no excuses!

The pig industry is arguably one of the most business focused sectors of the Northern Ireland agricultural industry. As total costs represent over 90% of pig price (2007/2008 Pig Benchmarking results), the margin per pig is small. Producers must therefore have an accurate and up-to-date knowledge of the physical and financial performance on their unit. To allow this, good recording and analysing systems are essential.

Basic production information

All producers keep at least some basic production records such as service and farrowing dates. Sow cards kept beside each sow are an ideal way to record this information and the stockperson can easily see the history of the sow at weaning or service. Also when a sow card is lost it is an irritation, but when the service book slips through the slats it is a disaster!

Computer records

Service, farrowing and weaning information not only help with sow management, but allow herd performance to be calculated in terms of conception rate, litter size and litters per sow per year. Simple computer spreadsheets make these calculations very easy and CAFRE Pig Technologists have successfully trained producers to use this method of analysis. This route often allows producers to progress to more detailed computer recording systems, which many of the larger units are now finding invaluable. Purpose built computer recording programmes also allows the use of Personal Digital Assistants (PDA's). These small hand held devices enable producers to enter sow data on the farm and then upload it to the office computer for analysis.

PDA's were promoted through a Pig Technology project and many producers now rely heavily on these for practical data recording. By using the same computer recording programme, data from a number of farms can be combined and analysed to

give more detailed information on national sow performance. Pig Technologists have recently collected this data for over 8000 sows recorded by this method and results are discussed in a later article.

Pig Benchmarking versus PiGIS

Pig Benchmarking is now in its eighth year. It is universally accepted as providing accurate averages for physical and financial performance. Over one third of the sows in the Northern Ireland herd are currently recorded through the Benchmarking programme. Analysis of results allows producers to compare their performance with industry averages and identify areas for improvement in their business. Benchmarking results are also fully discussed in a later article.

The Pig Grading Information System (PiGIS) completes the benchmarking package, allowing producers to assess the quality of their carcasses with "the best or the rest" of the pig industry. Producers don't even have to input data as it is automatically done by the processing plants – a win win situation! Practical examples of PiGIS reports and analysis are covered later in the booklet.

Recording is essential! As there is a recording package to suit every producer, you have no excuse not to record!

For further information contact Mark Hawe

Greenmount Pig Benchmarking

Pig producers throughout Northern Ireland (NI) use benchmarking to calculate and compare performance. Benchmarking allows producers to find out how their own business is performing. They **know** how many pigs they sell per sow per year, how much feed they use, how much it takes to feed a pig and the break-even cost of production. They also **know** how the performance of their unit compares with other units in NI.

Overall performance

The overall performance of benchmarked units has improved over recent years. Table 1 shows the average physical performance of benchmarked units for the last five years. Over the five years, pigs produced per sow per year has increased by 1.3 pigs per year, kilograms of pigmeat per sow per year has increased by over 100 kg, feeding herd feed efficiency has improved by 0.09 and carcass weight has hovered between 77 and 80 kg.

Table 1: Average physical performance on benchmarked units for the last five years

	03/04	04/05	05/06	06/07	07/08
Pigs produced/sow/yr	19.5	19.5	19.8	19.8	20.8
kg of pigmeat/sow/yr	1524	1539	1559	1582	1630
Sow feed/sow/yr (tonne)	1.3	1.3	1.3	1.3	1.3
Total feed/pig produced (kg)	304	307	304	309	296
Feeding herd feed conversion	2.48	2.45	2.43	2.43	2.39
Replacement rate (%)	44	41	42	48	44
Carcass weight (kg)	77.1	78.9	78.8	79.9	78.3

However, over the same period production costs have increased by almost 18%. Although all costs have increased, the largest increase was in feed. The 11.8 p per kg increase in feed from March 2004 to July 2008 has added almost £10 per pig to production costs. There was also a 4.4 p per kg increase in common costs such as electricity, water, healthcare and miscellaneous items.

Range in performance

Benchmarking continues to show a range in performance. There are units in NI which achieve excellent levels of performance, comparable with the best performing units in Europe. However, there are still units where there is room for improvement. The range is especially evident when we compare the performance of the top 25% group with the bottom 25%. In the top 25% group:

- 5½ pigs more are produced per sow per year
- 450 kg of pigmeat more are produced per sow per year
- feeding herd feed conversion is 0.39 better
- 56 kg extra feed fed per pig

As with physical performance there is a large variation in the financial performance of benchmarked units. In the top 25% group:-

- pig price 8 p per kg higher
- feed cost 13.8 p per kg lower
- healthcare costs 3.8 p per kg lower
- heat/power/light 1.7 p per kg lower
- total costs of production 19.3 p per kg lower

Table 2 shows the large range in the physical performance of benchmarked units.

Table 2: Range in physical performance

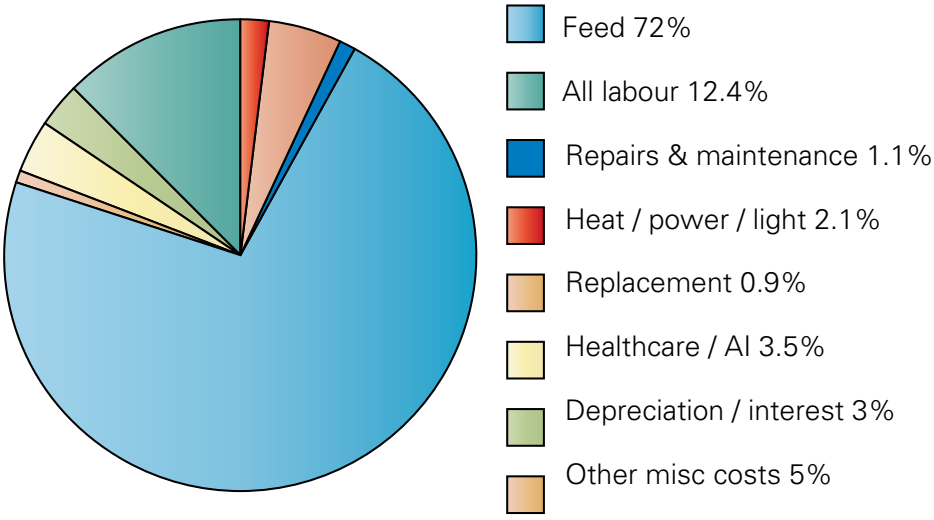
	Average	Top 25%	Bottom 25%
Pigs produced/sow/year	20.8	23.8	18.3
kg of pigmeat	1630	1860	1410
Total feed/pig produced (kg)	296	272	328*
Feeding herd feed conversion	2.40	2.20**	2.59**

* + 5 kg difference in average carcass weight

** Similar carcass weight

Breakdown of costs

Figure 1: Breakdown of costs on a typical benchmarked unit.



As can be seen from Figure 1, feed represents 72% of total costs on a typical benchmarked unit. One area where it may be possible to reduce feed costs is to feed less of the expensive

creep and link rations. Table 3 shows that the average amount of creep and link fed on benchmarked units is 6 and 10 kg respectively. However, on some units almost three times the average is fed, adding significantly to overall feed costs.

Table 3: Range in rations fed on benchmarked units

	Average	Range
Creep (kg/pig)	6	1-17
Link (kg/pig)	10	0-23
Grower (kg/pig)	57	29-97
Finisher (kg/pig)	160	90-220

Greenmount Pig Benchmarking allows you to compare the performance of your unit with the best in NI. If you are serious about pig production benchmarking is a must.

For further information contact Liz Donnelly

Education and training are good investments

It has been said that "education is costly but ignorance is more costly". This is true of pig production where all staff, from owners and managers to stock people, must know how to maximise output from the unit. With constant changes in technologies and equipment, housing design, diseases, genetics, legislation, etc all staff must be constantly updated. Pig Technologists have continued to work with the industry to provide practical courses at all levels.

Back to basics

Last year the local pig industry relied heavily on migrant workers to provide labour. However, their knowledge of pig production was limited. To help remedy this, an introductory course on pig production was offered and delivered in Polish. The response was very good with 12 participants taking a very active part in the course and discussion. The response was so positive that the same course was repeated for local workers, again with a good response.

With the loss of many migrant workers and locals taking their place, it is anticipated that the latter course will be repeated this autumn, again focusing on practical management to improve performance.

Pig Challenge to meet the challenge

The Business Challenge for Pig Farmers course is now well established as a more advanced pig course for owners and managers. It provides an NVQ Level 3 qualification and although it is very practical, it also focuses on business aspects of pig production. Modules cover pig benchmarking, health, nutrition and environmental legislation and worksheets help apply these issues to each participant's unit. Again, it is planned to offer another Business Challenge for Pig Farmers course this year.

Technology makes the work smaller!

As every pig industry is striving to maximise performance at minimum cost, there is a wealth of knowledge available across the world. New technology means that distance is no longer a problem, with video conferencing allowing experts to share knowledge without having to travel. This was put to the ultimate test last year with great success when Professor John Carr from Australia talked directly to a group of pig managers at Greenmount Campus using this technology. Although John literally could not have been any further away, the time delay was only about one second. This technology gives the pig industry an excellent opportunity to tap into existing world knowledge without getting on a plane!

Continuing education and training are essential at all levels to meet the challenges of modern pig production.

Remember: Anyone can steer the boat in calm waters but only the well trained can navigate in a storm!

For further information contact Mark Hawe

Opportunities and technologies

Few forecasts in the pig industry are reliable, but we can be reasonably confident that the progress in improving production parameters will continue to be greater for sow productivity than for finishing herd performance. In the world of pigmeat exports, too, the only real certainty is that the ability to enter a new market depends on currency exchange rates. The organisers of the Northern Ireland Pig Event 2009 have asked me to assess briefly what extra possibilities might exist for marketing NI pork in Europe. While we cannot pre-judge exchange rates, we do know that supplies of pigmeat within the European Union area are decreasing due to a scaling back of pig numbers.

Data for the EU-27 countries at the end of 2008 showed a 5.6% reduction in the total pig population with a 3.9% drop for the number of sows. The information since then has indicated a further decrease in sow inventory, although proportionally less than last year. When the food/agriculture organisation of the United Nations (FAO) and the Organisation for Economic Co-operation and Development (OECD) published their latest joint projection of the pig market, they said pigmeat production in the EU-27 this year (2009) was likely to fall below 22 million tonnes from a figure of around 22.5 million tonnes in 2008. Despite the expectation that the overall demand for pork in Europe would not grow during the current year (because of the recession's effect on disposable incomes and food buying habits), at least a 10% annual increase in pigmeat imports was thought possible.

Individual country reports have suggested some longer term trends. For example, Dutch sow numbers were down by around 3% in December 2008, but a report in The Netherlands predicts a 10% fall in the size of the national industry over the coming 10 years, due mainly to an escalation of costs for manure disposal.

Germany meanwhile is seeing predictions that it will develop further as primarily a place for finishing pigs born in neighbouring countries. The number of herds with breeding sows in Germany fell by 10% in the 12 months to the end of 2008. Nationally, there were 5% fewer sows and 1.3% fewer pigs in total. At the same time there is some conversion of weaner-producing units to farrow-to-finish, driven by favourable bank finance approval for a family farm typically with 200 sows to invest in a matching 1500-pig finishing unit. Most imported weaners in 2009 originate from Denmark and The Netherlands, although some have even arrived from France.

With Germany leading the way, the main European centres of pigmeat consumption will be looking for pork supplies in the second half of 2009. They will tend to look first to central and eastern Europe in the hope of sourcing the least-cost supplies. However, there will be spot opportunities in the next six months to deliver value-added products to them rather than commodity cuts.

The fact that Europe's pork production has not dropped as quickly as the sow count is a confirmation of the continuing trends for our sows to rear more pigs and for average carcass weights to rise. That target of 30 pigs per sow per year which once seemed so far out of reach is now being achieved by some of the top producers.

A report this year in Pig International drew considerable attention when it referred to a measurement widely used in parts of Europe, based on the number of pigs born alive per litter and called a Piglet Index. This report pointed out that, as more of us work with batch farrowing systems, we need to have a good way of monitoring the farrowing success of batch-mated sows and gilts. The index helps in this respect because it is calculated simply by multiplying the number of pigs born alive per litter by the farrowing percentage.

Say that there were 12 live born pigs and the farrowing rate was 92%. In this example the index would therefore be 1104, putting the herd in the higher echelons of European performance.

More importantly, it would show that the herd was on course to produce 25 pigs per sow, but would need to step up in the born alive figure or farrowing percentage (or both) to be within sight of that 30 pigs per sow target. An enterprise weaning at 28 days generally needs to have a Piglet Index of 1300 or more to qualify as a 30-pigs contender.

Of course, this will also direct the focus towards the stillbirth rate and the mortality rate up to weaning. Producers in Denmark currently are aiming to cut the number of pigs stillborn. Their advisers believe that a significant share of the stillbirths recorded were in fact pigs that might have been saved with the appropriate intervention.

The problem could be that saved piglets are small or slow growing. Potentially of interest then would be the use of a Dutch designed arrangement for liquid feeding of laggard pigs in the farrowing pen. The design of the pen itself is also coming under new inspection. Bigger litters will need more space before they are weaned, so there is a trend led by the Danes to increase the dimensions of pens in the farrowing house. Covered or lidded creep areas are making something of a revival in places to create the right micro-climate zone for a larger litter without wasting energy.

Moreover, research results reported this year by a Dutch experimental station lend weight to the view that we have been making our sows too hot. The researchers tried a layout in which the floor section immediately under the sow was water-cooled. They found this form of temperature control was capable of increasing sow output by up to a pig a year attributed to an improvement in comfort levels and an accompanying rise in the sow's daily feed intake.

Above: Farrowing pen design is receiving considerable attention in various countries, from aspects of animal welfare as well as to accommodate larger litters. (Photos courtesy of Quality Equipment and APC)

Right: Cooling the floor under the sow has proved to increase her feed intake and productivity, even in temperate European climates.

Persuading sows to eat enough to rear extra-large litters has become the big challenge internationally. It asks two basic questions:

- What quantity is the sow willing to eat?
- How much is she physically capable of eating?

Proceedings for the Northern Ireland Pig Event in 2004 said that targets had been set for the Hillsborough research herd of feeding a total of 200 kg per sow over a 28-day lactation. To achieve an average of over 7 kg per day would be laudable in most herds, yet there are producers who want to push the amount even up to 9-10 kg in order to support more milk production for more pigs born. Certainly it will not be achieved without careful attention to the environment and comfort of the sow. These affect her willingness to eat, as does the ready availability of clean water remembering the advice that lactating sows need up to 40 litres of water per day.

Feed type, feeder design and frequency of feeding all have an important part to play in encouraging her to eat. A large sow enterprise in Canada is currently re-equipping all its farrowing places with a robotic method of portion feeding, after it found that this out-performed *ad libitum* for total quantity consumed in a lactation. The sows were stimulated to come to the trough by each operation of the feed dispenser and also their intake history was being monitored electronically so the manager could identify discrepancies and intervene as appropriate.

We can all cite instances where frequent feeding and liquid feeding are being used with apparent success for the lactation period. Newer techniques include the case of a herd in which a relatively low-density ration is given in pregnancy, at an average of 3 kg per sow daily, followed by 6.75 - 7 kg per day of a conventional lactation feed (containing 14% crude protein/ 0.85% lysine and 14.4 MJ DE) up to weaning at three weeks. Overall, the herd is feeding 1.25 tonnes per sow per year and producing over 30 pigs weaned per sow.

Unfortunately, some of its details of feed access may not match welfare rules that demand daily feeding. This is because the gestating sows start on a skip system that denies them feed for two days after they have completed three days of *ad libitum* (beginning at about day 28 of pregnancy). It is worth noting, however, that the low-density/high-intake approach afterwards in gestation is aimed at preparing their stomach capacity for an acceptable level of consumption when the sows have many pigs to nurse.

Equally, it may be of interest that German producers who use bedding have been advised to withdraw sows' access to straw for up to two weeks before their move into the farrowing house. The argument made is that cereal straw does not absorb moisture in a similar way to some other fermentable forms of fibre and that this property can lead at times to problems of

constipation soon after the sow farrows, with an associated drop in her appetite.

Again in Germany the question is asked about the right timing of the move from gestation to farrowing pen. One adviser has warned his clients that if they transfer sows less than a week before the due date, they should delay the changeover of feed from gestation to lactation type. He even recommends – for sows moved only shortly before farrowing – that the lactation diet should not be introduced for them until two or three days after they have farrowed in order that the dietary change does not coincide with the earlier stress.

More generally, a common denominator among liquid feeding units in western Europe seems to be that they do now focus on extending the stomach capacity of their sows. According to a set of guidelines agreed by some co-operating herds, there is relatively heavy feeding (equivalent to 3 kg daily) even in the immediate post-service period and another increase to around 3.5 kg over the final three weeks of gestation. The operators claim to be reaching intakes of up to 9 kg per day for the sows while in the lactation phase.

Among new techniques likely to be available in the next five years is a practical way of sorting boar semen to determine the sex of the progeny.

For further information contact Peter Best

CHAPTER 2

PRODUCTION RESEARCH

Drinker designs for weaners

It is essential that post weaned pigs have easy access to clean water to help optimise feed intake and growth rate. There are numerous drinker designs available, some of which claim to improve feed intake and growth rate. Drinker designs vary mainly in the flow rates they deliver and 'how easy' it is for pigs to access clean water. Recently water has needed to be taken into consideration by pig producers, not only due to local water charges but mainly due to its effect on slurry volume. The following trial compared the effect of commonly available drinker designs on pig performance and water usage.

Research

In the trial, the water supply was from the same header tank within the weaner accommodation and therefore flow rates were a function of drinker design. The normal bowl drinker, where pigs release water but drink it from the bowl, was compared with a nipple drinker within a bowl (pigs are meant to drink from the nipple), a bite nipple drinker (pigs need to bite and drink from the nipple at the same time) and a bite button drinker (pigs need to bite the button and drink from the nozzle at the same time) (Pictures of drinkers are below).

Bowl drinker

Verba nipple (in bowl) drinker

Bite button drinker

Bite nipple drinker

Pigs were weaned at 28 days of age and penned in groups of 20. Growth rate, feed intake, feed use efficiency and water usage was measured from weaning until pigs were 10 weeks of age.

How did drinker design affect pig performance and water usage?

The growth rate, feed intake and feed use efficiency of pigs offered water from the different drinker designs was similar. Table 1 reports the effect of drinker design on water usage. Flow rates and water 'usage' were higher from the Bite nipple and Bite button drinkers than from the Bowl or the Nipple in the bowl drinkers. Since there was no improvement in feed intake or growth rate using the drinker designs with higher flow rates, it is assumed that pigs attained adequate clean water using the Bowl drinker and the Nipple (in the bowl) drinker. This also suggests that the extra water 'used' when the Bite nipple and Bite button drinkers were used was wasted and contributed to a higher volume of slurry either by increased urine excretion or directly from the drinker.

Table 1: Daily water usage of pigs (litres/pig/day) between weaning and 10 weeks of age offered water from different drinker designs

	Bowl	Nipple (in bowl)	Bite Nipple	Bite Button
Flow rate (ml/min)	250	600	700	1200
Water usage (l/pig/day)	2.57	2.61	3.27	3.79

Conclusion

In this trial drinker designs which delivered water in a more accessible manner and with a higher flow rate increased water 'usage' but did not improve pig performance. It is concluded that this extra water 'used' was wasted. It is estimated that this 'wasted' water from the Bite nipple and Bite button drinkers would result in an extra 17 and 32 tanker loads of slurry (1500 gallon tanker) respectively from the weaner accommodation per year on an average 200 birth to bacon sow unit.

This work was jointly funded by DARD and PigRegen Ltd

For further information contact Elizabeth Magowan or Elizabeth McCann

Feeders for weaners

A key challenge for pig producers is to encourage feed intake immediately after weaning and increase feed intake through the grower phase. When feed intake is increased, growth rate should also increase, providing that feed is not being wasted from the feeder. However, previous work at Hillsborough has found that feeder design and feed form can have significant effects on feed wastage. Therefore any advantages of increased feed intake, or 'disappearance', are lost.

The 'Transition' and 'Jetmix' feeders, which generally offer pigs feed in the form of a wet gruel from a circular trough, were recently compared with the traditional 'dry' multi-space feeders. In addition, offering post weaned pigs feed in the form of meal compared with pellets was also investigated for a short period after weaning.

Research

The manufacturer of the Transition and Jetmix feeders advise that the Transition feeder should be used immediately after weaning and then the Jetmix feeder should replace the Transition feeder approximately 11 days after weaning. The Transition feeder is designed for smaller pigs of approximately 6-7 kg whereas the Jetmix feeder is designed for pigs weighing approximately 11 kg. Only meal can be used through the Transition feeder and, therefore meal offered from the dry multi-space feeder was included for comparison.

The feeders are approximately £700 each and therefore the performance of pigs offered feed from just the Jetmix feeder from weaning was also compared. Pigs were weaned at 28 days of age and penned in groups of 20. The growth performance and feed use efficiency of pigs was measured between weaning and 10 weeks of age.

How did feeder design affect performance and feed use efficiency?

The daily feed intake of pigs offered feed from the Transition and Jetmix or just the Jetmix feeder was approximately 100 g per day higher than that of pigs offered feed from the dry multi-space feeder (Table 1). However, the daily gain of pigs was similar which means that the extra feed 'used' must have been wasted. Table 1 reports that feed use efficiency was 7% poorer when the Transition and Jetmix feeders were used and 10% poorer when only the Jetmix feeder was used compared with when the dry multi-space feeder was used. Economically, this has significant implications on feed costs with it costing an extra 2 p to gain 1 kg when using the Transition and Jetmix feeder instead of the dry multi-space feeder (Table 1).

Table 1: The performance of pigs when offered feed from the different feeder designs between weaning and 10 weeks of age

	Transition + Jetmix	Jetmix	Dry multi-space
Weight (kg) of pigs at:			
Weaning	8.9	8.9	8.9
Weaning + 11 days	12.1	11.9	11.8
10 weeks	30.8	30.9	30.0
Daily gain (g/day)	533	535	515
Daily feed intake (g/day)	813	844	737
Feed use efficiency	1.53	1.58	1.43
Total feed cost per pig (£)	11.31	11.67	10.44
p/kg gain*	51.6	53.0	49.5

*Assuming pigs were offered 3 kg/pig of starter 1 (£600/tonne), 6 kg/pig of starter 2 (£450/tonne) and a grower diet (£280/tonne)

This equates to an extra £1936 per annum on a 200 sow unit for pigs to gain a similar weight between wean and 10 weeks of age. These results are similar to previous research where feed

use efficiency was found to be poorer when feed was offered from a circular communal trough and when feed is offered as a 'wet gruel'.

How did feed form affect growth rate and feed use efficiency post weaning?

The daily feed 'intake' of pigs was similar when they were offered either meal or pellets post weaning. However feed use efficiency was 33% poorer when feed was offered in meal form compared with pellets (Table 2). This poorer feed efficiency impacted on growth rate. The growth rate of pigs offered meal was 28% poorer compared with those offered pellets (Table 2). Again these large differences in feed use efficiency would have significant implications on feed costs.

This period of time represents a short interval within the life cycle of the pig but these results highlight the inefficiencies which can be attained when feeding a diet in meal form.

Table 2: The performance of pigs when offered feed in meal or pellet form for 11 days after weaning

	Meal	Pellets
Weight (kg) of pigs at:		
Weaning	9.0	8.9
Weaning + 11 days	11.0	11.8
Daily gain (g/day)	188	264
Daily feed intake (g/day)	280	261
Feed use efficiency	1.42	1.06

Did the Jetmix feeder improve the performance of small pigs?

A separate study was conducted to specifically identify if the Jetmix feeder could improve the growth rate of only light weight pigs at weaning.

These light weight pigs were offered feed from weaning from either a Jetmix or dry multi-space feeder. The growth rate and 10-week weight of light weight pigs offered feed from either the Jetmix or dry multi-space feeders was similar. However, the feed intake of light weight pigs offered feed from the Jetmix feeder was 15% higher and feed efficiency was 11% poorer than of those offered feed from the dry multi-space feeder (Table 3).

Table 3: The effect of feeder design on the performance of light weight pigs between weaning and 10 weeks of age

Weight (kg) of pigs at:	Jetmix	Dry Multi space
Weaning	7.8	7.8
10 weeks	30.1	29.3
Daily gain (g/day)	545	535
Daily feed intake (g/day)	880	766
Feed use efficiency	1.62	1.46

Conclusions

The growth performance of pigs offered feed from the Transition and Jetmix feeders was similar to that of pigs offered feed from the dry multi-space feeder. However, feed use efficiency was poorer and hence feed costs were higher when the Transition and Jetmix feeders were used. Furthermore, feed use efficiency was much poorer when feed was offered in 'meal' form compared with pellets. Offering post weaned pigs, including light weight ones, dry pellets from a multi-space feeder still appears to be the best regime to optimise growth rate and feed use efficiency.

This work was jointly funded by DARD and PigRegen Ltd

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Reducing the variation between pigs

It is a fact of nature that the growth rate of pigs of the same age and start weight will vary. However, if this variation is extreme it will have a major negative impact on profitability for the producer and will result in pigs with highly variable carcass weight and quality for the processor.

A large trial was conducted to investigate nutritional and managerial methods to reduce the variable growth rate of pigs within a batch. The nutritional strategies included offering pigs a 'high' or 'low' allowance of starter diets post weaning and offering them either 'high' or 'low' density finishing diets. The managerial methods involved penning pigs at weaning in either mixed weight groups of 20 i.e. light, medium and heavy weight pigs all together or in 'uniform' weight groups of 20 i.e. all light weight pigs in one group, medium weight pigs in a second group and heavy weight pigs in a third group.

Did nutrition reduce variation?

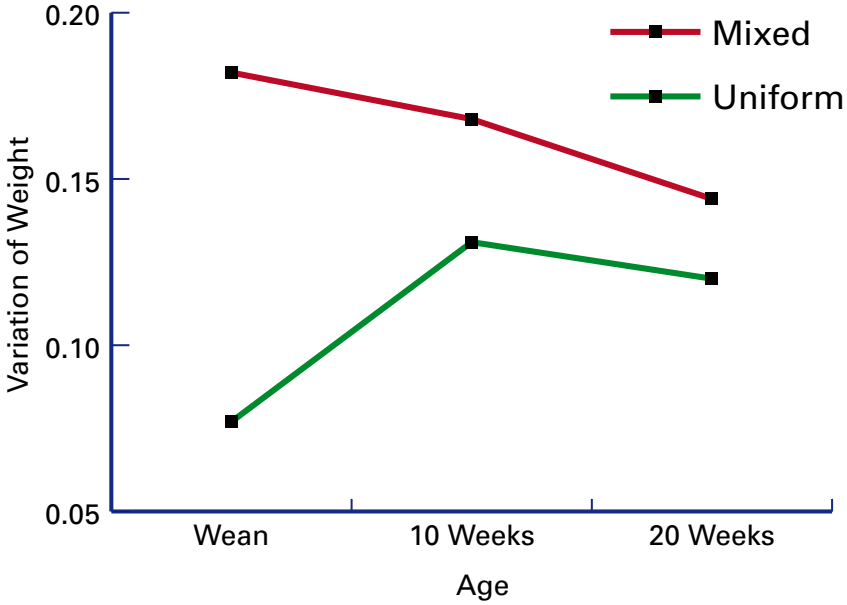
The nutritional strategies had no effect on growth rate variation during the post weaning period but it had an effect during the finishing period. In the trial half of the pigs stayed on a similar plane of nutrition be it 'Low' (offered a 'low' allowance of starter diets and a 'low' density finishing diet) or 'High' (offered a 'high' allowance of starter diets and a 'high' density finishing diet) while the plane of nutrition changed for the other half of the pigs i.e. offered a 'low' allowance of starter diets and a 'high density finishing diet or offered a 'high' allowance of starter diets and a 'low density finishing diet. The variation in weight of pigs was reduced 3 times more between 10 and 20 weeks of age when pigs were offered the same plane of nutrition from weaning to finishing compared with pigs whose plane of nutrition changed.

Further work is required to investigate this phenomenon and no recommendations can be made at this stage.

Did grouping method reduce variation?

When pigs were placed in uniform groups at weaning the variation in weight within each group almost doubled between weaning and 10 weeks of age, whereas that of mixed weight groups remained fairly constant (Figure 1). However, at 20 weeks of age, the variation in weight of uniformly grouped pigs, considering the light, medium and heavy weight groups as one large group, was still lower than when the light medium and heavy weight pigs were all mixed together in one pen.

Figure 1: Effect of grouping on the coefficient of variation of weight when uniform groups were considered separately



Conclusions

Although the variation in weight of uniformly grouped pigs increased after weaning, the variation in the weight of the uniformly grouped pigs at 20 weeks of age was still lower compared with pigs that were placed in mixed weight groups at weaning. Nutrition also affected the variable growth rate of pigs and work is ongoing to investigate this further.

This work was jointly funded by DARD, John Thompson & Sons Ltd and Devenish Nutrition Ltd.

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Comparison of terminal sire genetics available in Northern Ireland

Pre 'PMWS', Landrace was the breed which almost exclusively described the terminal sire genetics of slaughter generation pigs in Northern Ireland (NI). With the onset of PMWS in NI, Pietrain and Tempo genetics became popular choices due to their ability to increase the survivability of pigs in herds afflicted with the disease. These genetics are still readily available and provide NI producers with a range of options regarding terminal sire genetics.

The following trial was designed to compare Tempo, Landrace and Pietrain breeds available to NI producers. Two lines of genetics were available within the Pietrain breed – the Austrian and Belgium lines. Only two sires within each breed were used to minimise variation. Each of the three main AI stations in NI were asked to supply semen from their best 'sires' within a specific breed. For example semen from a maximum of two 'Landrace' sires were requested from one of the stations and this was compared with two 'Pietrain Austrian' sires from a second station. One station supplied genetics from two sources. Pigs were weaned at 28 days of age and penned in groups of 20 from weaning to slaughter (approximately 105 kg). All pigs were offered the same dietary regime under the same management conditions.

Effect of genetics on birth and wean weight

Although 'Pietrain Austrian' litters were numerically larger with one extra pig per litter born alive, their birth weight was on average 0.14 kg lighter and their pre-weaning mortality was 10.5% higher than pigs from the other sire line breeds. Overall, the average daily gain of piglets pre-weaning from all genetics was similar as was the number of piglets weaned and the total weight of piglets weaned per litter.

Effect of genetics on performance

Pig performance was similar for all genetics between weaning and 10 weeks of age. However, sire breed had a significant effect on finishing pig performance (Table 1).

Table 1: The effect of sire breed on finishing pig performance (10 weeks of age to finish)

	Landrace	Pietrain (Austrian)	Pietrain (Belgium)	Tempo
Finish weight (kg)	99.7	100.7	98.1	104.7
Performance :				
Daily gain (g/day)	804	815	794	888
Daily feed intake (g/day)	2083	2027	2006	2119
Feed use efficiency	2.68	2.52	2.59	2.44
Carcass performance :				
Backfat depth at P_2 (mm)	13.9	12.8	12.6	12.9
Kill out (%)	75.8	77.4	77.0	76.1
Feed:carcass gain	2.76	2.64	2.68	2.59

The growth rate and feed intake of Tempo pigs during finishing was 84 g per day and 80 g per day, respectively, higher than the average of pigs from the other sources of genetics. The feed use efficiency of Tempo and Pietrain Austrian pigs was better than that of Pietrain Belgium and Landrace pigs. Landrace pigs were fatter than the other pigs. The kill out percentage of Pietrain Austrian and Belgium pigs was higher than that of the Tempo and Landrace pigs. Tempo pigs were the best at converting feed to carcass gain while Landrace pigs were the worst.

Effect of slaughter weight on carcass quality

A proportion of pigs within each breed were sent for slaughter at either 95, 105 or 115 kg live weight which corresponds to

carcass weights of approximately 73, 81 and 88 kg. Across all genetics, when slaughter weight increased to 115 kg, the backfat depth of all pigs increased (Table 2) and kill out percentage remained fairly constant (Table 3). However, even at these weights, the carcasses of Pietrain Austrian and Belgium and Tempo pigs would still be considered as 'code 1' but Landrace pigs would be penalised. Economically, taken to 105 kg, Tempo and Pietrain Austrian pigs had a similar margin over feed which was approximately £4.40 per pig more than Landrace pigs and £1.40 per pig more than Pietrain Belgium pigs.

Table 2: The back fat depth at P_2 of pigs slaughtered at heavy slaughter weights

	Norwegian Landrace	Pietrain (Austrian)	Pietrain (Belgium)	Tempo
95 kg	12.9	11.7	12.1	12.0
105 kg	14.9	13.0	13.3	13.0
115 kg	15.4	14.0	13.6	13.4

Table 3: The kill out % of pigs slaughtered at heavy slaughter weights

	Norwegian Landrace	Pietrain (Austrian)	Pietrain (Belgium)	Tempo
95 kg	74.8	78.0	76.9	76.5
105 kg	76.2	78.1	76.6	76.5
115 kg	77.2	78.5	78.2	75.8

Conclusion

In conclusion, Tempo pigs grew faster and were more efficient than Pietrain Austrian or Belgium or Landrace pigs. However, the carcass performance of Pietrain pigs was superior to Tempo and

Landrace pigs. There was a lower financial cost associated with the rearing of Tempo pigs but when carcass value was taken into consideration it was found that Tempo and Pietrain Austrian pigs had a similar margin over feed. Due to their high growth rate, more efficient use of housing could be achieved using Tempo pigs as they reached 105 kg approximately one week earlier than Pietrain Austrian pigs which were the next fastest.

This work was jointly funded by DARD and PigRegen Ltd.

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Deep intrauterine insemination

At least 80% of the sow herd in Northern Ireland is artificially inseminated. The traditional method of insemination involves the use of a sponge catheter which delivers semen into the cervix of the sow. Sows are normally inseminated twice within each heat to ensure a successful conception. Recently a new type of catheter was introduced – the Deep Intrauterine (DUI) catheter which delivers semen into the uterine horn and closer to the egg. Manufacturers suggest that only one insemination is required using this catheter to achieve conception. However, DUI catheters are more expensive than normal catheters and success depends largely on accurate and timely heat detection and subsequent insemination and good hygiene practices.

The following trial compared the use of the DUI catheter with the traditional catheter and insemination regime.

Research
In total 180 sows were used and 3 'insemination procedures' were compared. There were 60 sows used per procedure and the average sow parity was six. All sows were examined for heat at 8.00 am and 4.00 pm.

Treatment 1 - 'Normal'
Sows were inseminated twice using a normal catheter. If heat was detected at 8.00 am the first insemination took place 2-3 hrs later and the second 24-26 hrs after detection. If sows were detected in heat at 4.00 pm, the insemination took place at 8.00 am the following morning and the second 24 hrs later.

Treatment 2 - 'DUI + Normal'
After detection, sows were inseminated in the same pattern as above. In this treatment a DUI catheter was used in the first insemination and a normal catheter was used in the second insemination.

Treatment 3 - 'DUI Once'
After detection as described above, sows were inseminated once using a deep intrauterine catheter 24 hrs after detection.

The effect of method on conception rate
The group of sows which were inseminated using the DUI catheter on the first insemination and the normal catheter on the second had the highest conception rate at 88%, the sows inseminated twice with the normal catheter had a conception rate of 80% but the sows inseminated once with the DUI catheter had the lowest conception rate of 72%.

The effect of method on productivity
Sows which repeated were removed from the trial and therefore only productivity data from sows which held to their first service were considered when investigating the effect of insemination procedure on productivity. Sows which were inseminated only once using the DUI catheter had the lowest number of piglets born and number born alive (Table 1). Sows which were inseminated using the DUI catheter and then the normal catheter had the largest number of pigs born. These sows had 1 extra pig born alive compared with sows inseminated only once using the DUI catheter. As expected, as the number of pigs born increased, the average birth weight of pigs decreased. However, in this case the difference was not excessive and would be commercially acceptable.

Table 1: The effect of insemination procedure on the productivity of sows

	Number born alive	Number born dead	Average birth weight of piglets born alive (kg)
Normal twice	11.7	1.9	1.55
DUI + Normal	12.1	2.4	1.50
DUI once	11.1	1.9	1.58

Conclusion

In this study the lowest conception rate and lowest number of pigs born alive were the result of inseminating sows with the DUI catheter once. Under normal commercial management where sows are inspected for heat and inseminated within time blocks, it is difficult to ensure high success rates using the 'once' method. However, the combination of the DUI catheter with a normal catheter within a 'twice' insemination procedure optimised conception rates and the number of pigs born alive with little effect on the average birth weight of piglets born. It was also observed that the process of insemination using the DUI catheter, after it was inserted, took approximately 30-60 seconds compared with 90-120 seconds for the normal catheter. If the DUI catheter was to be used on farm specialised training is required as incorrect use can damage the reproductive tract within the sow. A high standard of hygiene should also be in place since the insertion of a 'dirty' catheter would deliver infection deep into the reproductive organs of the sow.

This work was jointly funded by DARD and PigRegen Ltd.

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The use of starter diets to optimise performance post weaning

It is highly important that the growth rate of pigs during the post-weaning period is optimised. However, the optimisation of growth rate post weaning must be conducted efficiently to optimise profitability. The post-weaned pig cannot physically eat enough feed to optimise its growth rate potential. Offering starter diets with a high energy and lysine (protein) content and which contain ingredients that are easily digestible can help to optimise performance. However, these high energy and lysine diets with special ingredients are very expensive and as such need to be carefully used.

The standard dietary regime at AFBI Hillsborough means that each weaned pig is offered 3 kg of a starter 1 diet with 16.5 MJ per kg of digestible energy, 22.5% protein and 1.7% total lysine followed by 6 kg of a starter 2 diet (link diet) with 16.25 MJ per kg digestible energy, 21% protein and 1.55% total lysine. In practice a pen of 20 pigs, for example, are offered 60 kg of starter 1 and 120 kg of starter 2.

Greenmount Benchmarking data suggests that pig producers are, on average, offering pigs 6 kg per pig of the starter 1 diet followed by 10 kg per pig of the starter 2 diet. It is questionable if these levels of starter diets are required. A series of trials have recently been conducted to assess the growth rate and feed use efficiency response of post-weaned pigs offered varying levels of starter 1 and starter 2 diets. In all trials pigs were weaned at 28 days of age and penned in groups of 10. The groups comprised small, medium and large pigs.

Trial 1 – Response to increasing levels of starter 1 diet
Pigs were offered either 2, 4, 6 or 8 kg per pig of starter 1 diet described above. All pigs were then offered 10 kg per pig of starter 2 (link) diet and then grower diet to 10 weeks of age.

Increasing the amount of starter 1 diet did not **significantly** increase the average weight of the group of pigs at 7 or 10 weeks of age (Table 1). There was no improvement in feed use efficiency either (Table 1).

Table 1: Effect of starter 1 diet inclusion on pig production performance post weaning

	2 kg/pig	4 kg/pig	6 kg/pig	8 kg/pig
Weight (kg):				
Wean weight	9.0	9.0	9.0	9.0
7 wks	16.6	16.8	16.9	16.8
10 wks	29.9	29.8	30.6	30.3
Daily gain (g/day):				
4-7 wks	380	387	392	389
7-10 wks	627	616	645	635
Daily feed intake (g/day):				
4-7 wks	427	432	431	418
7-10 wks	930	900	922	911
Feed efficiency:				
4-7 wks	1.11	1.09	1.12	1.07
7-10 wks	1.47	1.44	1.46	1.44
Feed costs:				
Total (£)	10.40	10.94	11.80	12.36
p/kg gain	49.8	52.6	54.6	58.0

It cost an extra £1.96 per pig to feed 8 kg per pig compared with 2kg per pig. The growth rate response of light weight pigs (average 7.8 kg) was also examined. A higher level of starter diet did not significantly improve their 10 week weight or daily gain between weaning and 10 weeks.

Trial 2 – Response to increasing levels of starter 2 (link) diet

Pigs were initially offered 4 kg per pig of the starter 1 diet and then offered either 6, 8, 10 or 12 kg per pig of starter 2 (link) diet. All pigs were then offered grower diet to 10 weeks of age. Increasing the amount of starter 2 diet did not **significantly** increase the average weight of the group of pigs at 10 weeks of age. There was no improvement in feed use efficiency either (Table 2). Again the growth rate response of light weight pigs (average 7.8 kg) was also examined and no improvements were observed in the weight of pigs at 10 weeks of age.

Table 2: Effect of starter 2 diet inclusion on pig production performance post weaning

	6 kg/pig	8 kg/pig	10 kg/pig	12 kg/pig
Weight (kg):				
Wean weight	9.0	9.0	9.0	9.0
7 wks	17.0	17.3	16.9	17.4
10 wks	29.8	30.7	29.8	30.7
Daily gain (g/day):				
4-7 wks	399	413	394	416
7-10 wks	604	628	610	629
Daily feed intake (g/day):				
4-7 wks	440	459	425	460
7-10 wks	924	930	913	913
Feed efficiency:				
4-7 wks	1.10	1.11	1.09	1.10
7-10 wks	1.53	1.53	1.51	1.46
Feed costs:				
Total (£)	10.46	10.94	10.98	11.41
p/kg gain	50.2	50.4	52.8	52.8

Trial 3 – Do pigs need a starter diet at all post weaning?
Pigs were offered either no starter 1 diet or 2 kg per pig of starter 1 diet. All pigs were then offered 4 kg per pig of starter 2 diet and a grower diet to 10 weeks of age. The 10-week weight of pigs that did not receive any starter 1 diet was almost 2 kg lighter than those that received 2 kg of starter diet. In addition their feed use efficiency was 8% poorer between weaning and seven weeks of age (Table 3).

Table 3: The effect of excluding starter 1 diet post weaning

	0 kg/pig	2 kg/pig
Weight (kg):		
Wean weight	9.0	9.0
7 wks	14.2	15.2
10 wks	25.7	27.9
Daily gain (g/day):		
4-7 wks	260	318
7-10 wks	549	603
Daily feed intake (g/day):		
4-7 wks	343	385
7-10 wks	782	844
Feed efficiency:		
4-7 wks	1.33	1.21
7-10 wks	1.44	1.42

Conclusion
Starter diets are required to promote growth performance post weaning. However, it is proposed that the levels used on some farms could be refined to achieve similar performance.

A reduction of 2 kg per pig of starter 1 diet would result in savings of approximately £5000 per annum on a 200 sow unit.

Farms differ in their health status, weaning weight of pigs and management ability and therefore it is not correct to make blanket recommendations for starter diet usage within Northern Ireland.

However, this research highlights that producers should carefully examine their starter diet usage, especially if using high levels of starter diets, to both optimise the transfer weight of pigs to the finishing accommodation and the cost to gain each kg of weight in the post weaning period.

This work is still underway and is being jointly funded by DARD and PigRegen Ltd.

For further information contact Elizabeth Magowan

Energy usage on pig units

It is estimated that the annual cost of providing energy (electricity and oil) to pig units in Northern Ireland (NI) is £1.56 million. This is a significant cost and is a cost that has increased over recent years. Energy audits, benchmarking and surveys have shown that there is a wide range in the amount of energy used on pig units. A Republic of Ireland survey showed a range from 17 to 37 units per pig sold, the average being 27 units. On most units in NI there are areas where changes can be made that will result in less energy being used. The knock-on effect of this is lower electricity and oil bills.

Energy audits

Energy audits are a simple way of identifying where savings can be made. Here are audits carried out on two local units.

Audit 1 - 100 sow birth to bacon unit

Problem – the farrowing house has front covered creeps. The heat bulbs are changed from 175 w to 100 w after the pigs are two weeks old. A 50% dimmer is used to control the bulbs. However this is not providing adequate control.
Recommendation – improve the level of control by fitting a master dimmer with thermostatic and profiling control.
Potential saving - £40 per creep per year

Problem – the heat pads are controlled by a dimmer numbered 1-6. Even though the controller is set at the lowest setting the pad temperature is still too high for some pigs.
Recommendation – install a better controller which works on actual floor temperature and profiles the input over the pigs life.
Potential saving - £800 per creep per year

Problem – the minimum ventilation rate is set too high in the weaner house, resulting in the heater having to come on to compensate for heat lost through excessive ventilation.

Recommendation – reduce the minimum ventilation rate to 15%.

Audit 2 - 150 sow birth to bacon unit

Problem – the unit uses Farm Popular tariff even though more than 11% of electricity is used at night. The single all day rate for the Farm Popular tariff at present is 15.65 pence.
Recommendation – change to Nightsaver tariff. The day rate for the Nightsaver tariff is 15.65 pence per kWh and the night rate 6.86 pence per kWh.
Potential saving – £425 per year

Problem - tungsten bulbs are used for lighting in an older finishing house. Tungsten bulbs are only 5% efficient at converting energy to light.
Recommendation – replace 50 100 w tungsten bulbs with 20 w compact fluorescent lights.
Potential saving - £228 per year

Problem – there is a build up of dust and dirt around the fans reducing the throughput of air.
Recommendation – clean fans, controllers and inlets regularly.
Potential saving – although the build up of dirt and dust does not affect running costs dramatically, it affects air throughput and temperature control.

Monitoring energy usage

The first step in making your unit more energy efficient is to monitor energy usage. Calculating units used per pig sold will provide a baseline against which to work. The effect of changes made can then be established and the financial benefits calculated. It may also be worthwhile installing simple electric metres in houses identified as possibly wasting energy. Again this will allow for the effect of changes made to be assessed.

CHAPTER 3

NUTRITION RESEARCH

The use of glycerol in diets for finishing pigs

Glycerol is a by-product of biodiesel production. Due to current government targets, biodiesel production has increased, thus glycerol has become available for use in livestock diets. Glycerol may be a useful source of energy in diets for pigs but there is limited research on the optimum level of inclusion, digestible energy (DE) content or the effect on performance.

The aim of this study was to investigate the effect of glycerol inclusion in finishing pig diets on performance.

Research
Four experimental diets were produced to contain 0, 4, 8 or 12% glycerol and offered to a total of 48 pigs housed in groups of six from 14-21 weeks of age. Feed was supplied *ad libitum* through electronic feeders which enabled individual pig feed intake to be recorded.

Results
Glycerol inclusion had no significant effect on feed intake or feed conversion ratio (FCR) but average daily gain decreased when glycerol was included at 40 or 120 g/day (Table 1). Glycerol inclusion increased feeder visits but decreased the total time spent at the feeder which may be due to reduced palatability.

In conclusion, glycerol may be included in finishing pig diets up to 8% but levels above this reduce performance. More work is required to establish the DE of glycerol.

Table 1: Effect of glycerol on performance and feeding behaviour

	Level of glycerol inclusion			
	0%	4%	8%	12%
Feed intake (g/day)	2527	2286	2528	2395
Average daily gain (g/day)	1031	927	995	905
Feed conversion ratio	2.45	2.47	2.55	2.66
Total number of feeder visits (pigs/24 h)	4.9	16.0	14.3	20.9
Total time at feeder (pigs/24 h)	2.82	1.39	1.89	1.34

This work was jointly funded by DARD, John Thompson & Sons Ltd and Devenish Nutrition Ltd.

For further information contact Elizabeth McCann or Elizabeth Magowan

Wheat or barley for pigs – which is best?

Cereal grains are a major component of finishing pig diets. Given their high cost, it is vitally important to ensure the best possible use of cereal is achieved in order to maximise margin over feed. Traditionally, barley has been included at higher levels than wheat due to its lower cost and also because of reports that high levels of wheat inclusion can cause stomach ulceration. However, wheat contains a higher digestible energy content than barley and has been reported to result in better performance in terms of liveweight gain, feed:carcass gain, feed conversion ratio and killing out percentage in comparison to barley-based diets. The aim of this study was to examine the effect of increasing dietary levels of wheat on the performance of finishing pigs and to investigate effects on the incidence of stomach ulceration.

Research

Four diets were produced, containing:

- 40% wheat : 30% barley;
- 50% wheat : 20% barley;
- 60% wheat : 10% barley;
- 70% wheat : 0% barley.

These diets were offered to a total of 480 Landrace x Large White pigs to determine feed intake, liveweight gain and feed conversion ratio from 10 weeks of age to finish (100 kg). Stomachs were scored for ulceration level at slaughter from a representative sample of pigs.

Results

As shown in Table 1, there was no significant difference in performance of pigs offered the diets with different wheat and barley inclusion rates, although pigs offered the 60% wheat diet tended to eat more and have slightly higher average daily gain than those offered the other diets. These pigs also had higher levels of backfat at the P_2 position, but the differences were not significant and would not affect payment. The pigs offered the 70% wheat diet were more efficient at converting feed into gain

and with current cereal prices (£130 per tonne for barley and £142 per tonne for wheat, at time of writing), the inclusion of 70% wheat resulted in the lowest feed cost per kg of gain.

Table 1: The effect of dietary inclusion of wheat and barley on pig performance and feed cost/kg gain (10 weeks of age – finish)

	40% wheat	50% wheat	60% wheat	70% wheat
Feed intake (g/day)	2114	2040	2133	2011
Average daily gain (g/day)	879	850	897	857
Feed conversion ratio	2.40	2.40	2.38	2.35
P_2 (mm)	12.7	12.3	13.0	12.5
Feed cost/kg gain (p)	57.6	57.1	56.4	55.2

There was no effect of wheat or barley inclusion rate on gut health as assessed by scoring for gastric ulcers. Very mild stomach ulceration was observed in seven pigs over the entire experimental period but this was not associated with any dietary treatment.

In conclusion, wheat or barley can be used in growing and finishing pig diets. The decision of which cereal to include can be based on current cereal prices at the time of formulation. This study also indicates that high levels of wheat or barley inclusion does not affect grading or cause stomach ulceration in growing or finishing pigs.

This work was funded by DARD.

For further information contact Elizabeth McCann or Elizabeth Magowan

The use of lupins in diets for growing pigs

Lupins contain high levels of crude protein (32-44%) and oil (5.3%). Therefore they have the potential to be both a protein and energy source for pigs. It has been reported that lupins can be included in diets for growing pigs at levels up to 25% with no adverse effects on performance. The use of lupins is therefore an attractive alternative to imported soyabean meal. The aim of this trial was to investigate the effect of substituting 4, 8 or 12% soyabean meal with lupins on pig performance.

Research

Four experimental diets were produced to contain 0, 4, 8 or 12% lupin seed meal. Soyabean meal was directly substituted with lupins and no additional modifications were made. Diets were offered to a total of 240 pigs from 10-15 weeks of age and average daily feed intake, average daily gain (ADG) and feed conversion ratio (FCR) were determined.

Results

Live weight at 15 weeks, feed intake and ADG decreased with increasing level of lupin inclusion (Table 1).

Table 1: Effect of lupin inclusion on pig performance

	Level of lupin inclusion			
	0%	4%	8%	12%
15-week weight (kg)	51.8	50.2	49.5	47.1
Feed intake (g/day)	1412	1380	1323	1203
Average daily gain (g/day)	614	568	547	477
Feed conversion ratio	2.31	2.43	2.42	2.52

There was no effect on FCR, which suggested that nutrient digestibility was unaffected. It is probable that diet palatability was reduced with increased lupin inclusion and therefore it is concluded that there is limited potential for lupins to be used as a protein and energy source for growing pigs.

This work was funded by DARD.

For further information contact Elizabeth McCann or Elizabeth Magowan

Predicting the digestible energy content of barley

There is a need in the feed industry for a rapid means of evaluating the nutritive value of feeds and feed ingredients. Chemical analysis provides only basic information and most of the laboratory techniques take too long for this information to be of use in feed formulation at the feed mill.

Historically bushel weight has been used to predict nutritive value of cereal grain. However, it has been well established that there is a poor relationship between bushel weight and nutritive value.

Therefore, near infrared reflectance spectroscopy (NIRS) has been suggested as an alternative method of predicting cereal nutritive value. The aim of this trial was to investigate the potential of NIRS to predict digestible energy (DE) content of barley for growing pigs.

Research

Pig diets containing 65% barley were produced from 39 samples of locally produced barley. These diets were offered to growing pigs and DE content of barley calculated. The barley samples were scanned onto NIRS equipment and calibration, validation and mathematical transformations performed to yield prediction equations.

The results of this study indicate that NIRS has potential to accurately predict barley DE content with an I-VR value of 0.69 and SECV value of 0.28. The higher the I-VR (validation relationship) and the lower the SECV (standard error) the stronger the relationship between predicted and actual.

While it is generally accepted that values for I-VR should be greater than 0.75, the value of 0.69 obtained in this study suggests the relationship between predicted and actual was reasonably strong.

Table 1: NIRS statistics for prediction of barley digestible energy content

	Average	I-VR	SECV
Digestible energy (MJ/kg DM)	15.6	0.69	0.28

NIRS appears to accurately predict the DE content of barley but as the sample set was small, more work is required in this area to enable firm conclusions to be drawn.

This work was funded by the DARD with assistance from the Thomas Henry Scholarship, Queen's University, Belfast.

For further information contact Elizabeth McCann

Predicting performance of pigs offered standard commercial diets

Weaning is an extremely stressful event in the pig's life. It is vitally important to maximise feed intake in the immediate post-weaning period to promote growth and maintain gut integrity and health.

Post-weaned pigs are offered highly digestible diets high in energy and crude protein. In order to assess the nutritive value of these diets, performance and digestibility trials must be conducted as there is no accurate alternative to predict nutritive value. These trials are time consuming, expensive and require large numbers of pigs to achieve scientifically sound results. Consequently, a number of alternatives to animal trials have been evaluated. The use of near infrared reflectance spectroscopy (NIRS) to predict performance from individual feed ingredients has been shown to have potential and there is some evidence to suggest that scanning of the complete diet could result in NIRS equations that may predict performance. The aim of this study was to investigate if NIRS could accurately predict the performance of pigs through scanning the complete diet.

Research

Post-weaning diets (173), formulated and produced by Devenish Nutrition Ltd, were offered to post-weaned pigs in a series of performance trials. Pigs were weaned between 21 and 35 days and offered starter 1 diet for 12-14 days post weaning and then starter 2 diet until 24-28 days post weaning (depending on specific experimental protocol).

Mean liveweight gain, feed intakes and feed conversion ratio were calculated. The diets were scanned onto NIRS equipment and calibration, validation and mathematical transformations performed to yield prediction equations.

Before independent validation was carried out, the prediction equations appeared to be able to accurately predict performance (Table 1) for starter 2 diets. The higher the I-VR (validation relationship), the stronger the relationship between actual and predicted performance. Also, the lower the SECV value (standard error) the stronger the relationship.

It is generally accepted that values for I-VR of over 0.75 indicate that NIRS is predicting accurately. Therefore, from these results it can be seen that intake, liveweight gain and FCR were accurately predicted using NIRS.

However, when independent validation was carried out it was found that the relationships weakened. Many other studies fail to conduct this final step of independent validation and therefore this work goes further in the area of NIRS.

It can be concluded that NIRS did not accurately predict performance of pigs offered standard commercial diets and that NIRS may be of more use in predicting the nutritive value of individual feed ingredients.

Table 1: NIRS statistics for prediction of performance

	Average	I-VR	SECV
Starter 1:			
Feed intake (kg)	3.08	0.71	0.27
Liveweight gain (kg)	2.80	0.67	0.33
FCR	1.11	0.66	0.07
Starter 2:			
Feed intake (kg)	7.56	0.75	0.42
Liveweight gain (kg)	5.94	0.81	0.39
FCR	1.25	0.88	0.05

This work was funded by Devenish Nutrition Ltd through a Knowledge Transfer Partnership with Queen's University, Belfast.

For further information contact Elizabeth McCann

Improving feed intake in post-weaned pigs

One of the major challenges facing pig producers and feed manufacturers is getting pigs to eat post-weaning. The cooking of feed ingredients during processing improves feed intake, and one of the main reactions in the cooking process is the Maillard reaction.

This reaction results in the bonding of proteins and sugars together giving Maillard Reaction Products (MRP). It is possible to create artificial MRP, and previous work has shown that they can be used to improve pig performance.

The aim of this research, undertaken in conjunction with Queen's University, Belfast and Devenish Nutrition Ltd, was to identify which raw materials were most efficient at carrying MRP in pig diets.

Research

Three bases were examined including maize, HiPro soya and wheat. The MRP were applied to the base raw materials to create a complementary feedingstuff and then added to a standard commercial diet at 2.5%. Diets were offered *ad libitum* over a 14 day period to post-weaned pigs and performance was monitored.

Results

Results of this work indicate that the type of cereal base used in combination with the MRP is important and significantly affects final piglet weight through increases in feed intake. Maize came out best, with wheat second and HiPro soya a poor third (Table 1). Significant differences were also observed in the carcass weight at the end of the trial, with maize giving the heaviest carcasses.

Table 1: The effect of complementary feedingstuffs containing MRP on post-weaning pig performance

	Complementary feedingstuff		
	Maize + MRP	Wheat + MRP	Soya HiPro + MRP
Pig weight (kg) Day 1	9.6	9.6	9.6
Pig weight (kg) Day 14	14.6	14.1	13.0
Feed intake (g/day)	359	334	261
Weight gain (g/day)	358	321	241
Feed conversion ratio	1.00	1.04	1.08
Carcass weight (kg)	11.8	11.4	10.4

In conclusion, pig diets containing a complementary feedingstuff composed of maize and MRP improved pig growth and carcass weight. These improvements are achieved due to increased feed intake, and therefore some headway has been made in solving the problem of poor feed intake post-weaning.

This work was funded by Devenish Nutrition Ltd through a Knowledge Transfer Partnership with Queen's University, Belfast.

For further information contact Elizabeth McCann

Feeding pigs for optimal performance

The cooking of feed ingredients in pig and poultry diets has been standard practice for many years and has been demonstrated to improve feed intake and growth. One of the major reactions in the cooking process is the Maillard reaction. This reaction results in the bonding of amino acids (in proteins) and sugars together giving Maillard Reaction Products.

It is possible to improve pig performance using solutions of Maillard Reaction Products, and research has been on-going to examine the use of Maillard Reaction Products in complementary feedingstuffs with a view to improving animal performance in the post-weaning period.

Previous work has shown that the base material used to carry these sugar-amino acid products is important. This work examined the effect of processing the maize-base material on pig performance. A range of maize particles from small to large grind size were compared for the efficiency of carrying the Maillard Reaction Products.

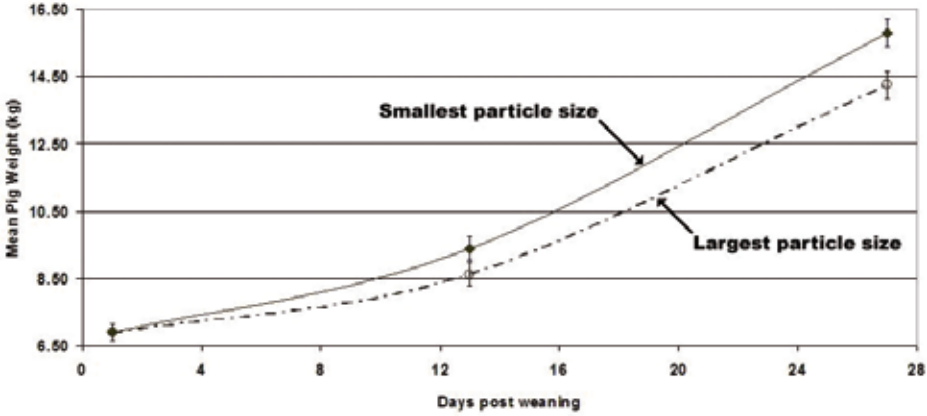
Research

Four complementary feedingstuffs were formulated and pelleted using Maillard Reaction Product solution and increasing particle sizes of the maize-base and added to a standard pig diet at a 5% inclusion rate. Diets were offered *ad libitum* to 96 post-weaned piglets over a 27 day period and performance measured. The particle size of the maize-base combined with the Maillard Reaction Product solution (forming the complementary feedingstuff) significantly affected pig performance.

The complementary feedingstuff with the smallest particle size gave the greatest increase in feed intake, leading to increases in growth rate and final pig weight, although feed conversion

efficiency was not affected. The most significant differences in pig weight were seen between the extremes of particle size (Figure 1).

Figure 1: Pig growth response curve to complementary feedingstuffs containing Maillard Reaction Products (MRP) on the smallest and largest maize-base particles



The addition of a complementary feedingstuff based on Maillard Reaction Products, with the maize-base ground to a small particle size, significantly improved pig growth and performance post weaning, mainly as a result of increased feed intake.

This work was funded by Devenish Nutrition Ltd through a Knowledge Transfer Partnership with Queen's University, Belfast.

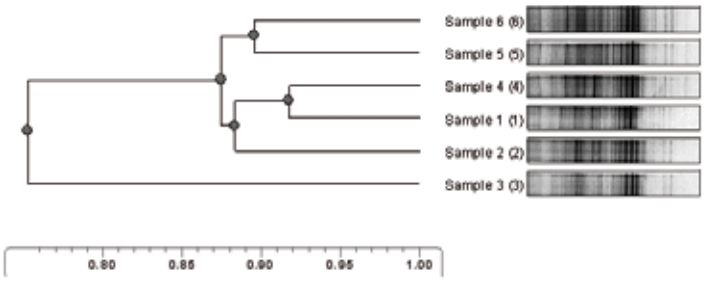
For further information contact Elizabeth McCann

How does the feeding of supplements affect the growth and survival of bacteria in the gut?

To understand fully the effects of feeding supplements to the diets of pigs it is necessary to study the influence of the additives on the microbiology of the porcine gut. At AFBI Newforge, this has been done traditionally by counting colonies on agar surfaces using specialised agars to detect pathogens such as *Salmonella* spp. and *Campylobacter* spp. However, it is now possible to use molecular biological techniques to study either total microbial populations (PCR-DGGE) or specific components of a population (quantitative real-time PCR).

These techniques have the advantage of being able to detect previously unknown bacteria. Figure 1 shows an example of the type of result obtained when this technique is applied to the study of samples of porcine faeces.

Figure 1: Dendrogram of DGGE of the faecal microbiota from pigs undergoing different feeding regimes



Faecal material was collected from pigs undergoing a feeding trial, DNA extracted and microbial DNA amplified by PCR. Fragments are then separated by electrophoresis through a denaturing gradient, stained and visualised. Figure 1 shows a dendrogram which groups samples. The effects of different feeding regimes on the faecal microbiota can then be compared.

The six lanes represent the analysis of bacterial DNA from pigs fed with increasing concentrations of yeast extract and each band visible of the gel represents a bacterial species. A total of 42 distinct species of bacteria could be identified of which 18 appeared to present in all samples. The dendrogram tree groups together the most similar samples and allows the microbiota of pig faeces from treated animals to be compared with that from an untreated control. The samples shared 75% similar bacteria suggesting that the microbiota of porcine faeces, and by inference the lower gut of the pig, has not been perturbed by the addition of the feed supplement. Table 1 lists the species recovered.

Table 1: A list of bacteria recovered from pig faeces

Lactobacillus amylovorus	*Streptococcus suis*	*Streptococcus suis*
Lactobacillus agilis	*Streptococcus gordonii*	*Streptococcus suis*
Lactobacillus salivarius	*Streptococcus bovis*	Three species of unidentified bacteria
Lactobacillus sp	Streptococcus sp	Swine manure bacterium
Eubacterium sp	*Acinetobacter radiodurans*	Carnobacterium sp
Eubacterium biforme	Butyrate producing bacteria	Ruminococcus sp
Clostridium sp	*Catenibacterium mitsuokai*	*Weissella paramesenteroides*
Clostridium metallolevans	*Acinetobacter radioresistens*	*Pseudomonas veronii*
	Delftia tsururhatenis	Swine manure bacterium
		Trichococcus sp

By contrast to DGGE which is qualitative, quantitative real-time PCR enables an estimate of bacterial numbers of specific bacterial species in a sample to be made. An example of the type of data which can be obtained is presented in Table 2.

The data shows that the presence of potentially dangerous bacteria can be detected without the need for culturing and this result can be achieved in a matter of a few hours.

Note from the data in Table 2 that both the pathogenic bacterium *Campylobacter* spp. and the probiotic species *Lactobacillus* can readily be detected although, neither of these important species would have appeared on DGGE gels because they form only a small proportion of the faecal microbiota.

Both these powerful and complementary molecular microbiological techniques are being applied to the study of animal nutrition by assessing the changes new feeding regimes have on the microbiota of the gut.

Table 2: Bacteriological analysis of samples of faeces from pigs fed with increasing concentrations of glycerol

Sample	*E.coli* equivalents per g	*Camplylobacter* spp. equivalents per g	*Lactobacillus* spp. equivalents per g
2a	$1.4x10^9$	$5.7x10^4$	$2.3x10^5$
2b	$7.4x10^9$	$1.2x10^5$	$3.7x10^5$
2c	$3.2x10^9$	$1.4x10^5$	$1.7x10^6$
2d	$1.9x10^9$	$3.0x10^6$	$2.4x10^6$
2e	$1.5x10^9$	$1.1x10^6$	$1.7x10^6$

For further information contact Keith Thompson

CHAPTER 4

ENVIRONMENTAL RESEARCH AND LEGISLATION

"New" lower values for nitrogen excretion from pigs

European legislation has been passed in an attempt to reduce the environmental impact of agriculture; i.e. the Integrated Pollution Prevention and Control Directive (IPPC) and the Nitrates Directive. IPPC aims to reduce all polluting emissions to air, water and soil and to make more efficient use of resources. The Nitrates Directive aims to prevent pollution of surface and ground water by excess nitrogen (N).

Although the pig industry is not the only contributor to environmental pollution, both of these Directives have implications for pig producers. N losses are an inevitable part of pig production but nutrition can play a role in reducing excretion as N excretion is directly related to N (or protein) intake.

Therefore, it is important to quantify N excretion from pig production. The aim of this trial was to determine N excretion from finishing pigs offered diets designed to supply the optimal level of protein to maintain performance.

Research

Ten finishing diets were formulated to contain increasing levels of crude protein (CP) at two levels of available lysine. These diets were offered to pigs on a performance trial (640) and a digestibility trial (80). Performance, nutrient digestibility and N excretion values were determined over the experimental period (13 week–finish). Using this data, N excretion was calculated per pig from weaning to finish (100 kg). It was found that the value

was considerably less than that published in the Nitrates Action Programme for Northern Ireland (2.4 vs 3.4 kg per pig) (Table 1).

This has major implications for pig producers and it is planned to use the results from this research to put forward a scientific case to the European Commission seeking a reduction in the stated values for N excretion from finishing pigs.

Table 1: Comparison of N excretion values (kg/pig) for pigs from DARD 2006 and "new" values from research

	DARD 2006	"New" values†
Wean to 100 kg	3.4	2.4

† Based on a diet containing 16.9% CP

This work was jointly funded by DARD, John Thompson & Sons Ltd and Devenish Nutrition Ltd.

For further information contact Elizabeth McCann or Elizabeth Magowan

Farm manures in Northern Ireland - a valuable resource

Manures produced by housed farm livestock in Northern Ireland are a valuable resource for plant fertiliser and renewable energy.

Housed farm livestock in Northern Ireland produce approximately 10 million cubic metres (2,200 million gallons) of undiluted manure each year. Almost 88% of this is from cattle with pig and poultry manures making up approximately 7% and 5% of the total respectively. Research work at AFBI Hillsborough is examining different ways of making use of this manure resource.

Manure as a fertiliser

Manures contain plant nutrients that are a valuable fertiliser. Applying slurry at the wrong time wastes nutrients and money. The total annual fertiliser requirements of agriculture in Northern Ireland are much greater than the fertiliser supplied by manures from housed livestock. In Northern Ireland, most slurry is land spread by splash plate. This method can lead to much of the available nitrogen applied in the slurry being lost to the atmosphere as ammonia. Ammonia losses can be lowered by reducing the surface area of the spread slurry that is exposed to air.

For grassland in Northern Ireland, slurry to air contact can be minimised by injection of slurry into shallow channels, band spreading and trailing shoe application systems. Trailing shoe application, in which a metal shoe parts the grass and slurry is deposited in bands on the soil surface, with the minimum of herbage contamination, has been shown in work at AFBI Hillsborough to be effective. When compared with a splash plate, the trailing shoe improved nitrogen efficiency and gave a window of opportunity for spreading slurry of up to three weeks after silage harvest.

Manure for renewable energy

Anaerobic digestion (AD) converts organic matter to biogas in the absence of oxygen. Biogas is an excellent form of renewable energy. Biogas can be burned through a gas boiler to produce heat or can be burned through a combined heat and power unit to produce electricity and heat. It is also possible to clean the biogas and use it as a vehicle fuel. Many European countries are using biogas to generate electricity. AD can either be carried out centrally or at farm level. In Denmark there are more than 20 centralised anaerobic digestion (CAD) plants. Typical agriculturally based CAD plants use farm products such as livestock manures (pig and cattle slurries) and crops as the main feedstocks, as well as other organic material from, for example, food processing. Co-digesting in this way can provide additional income through gate fees and through higher biogas yields.

Across Europe there are a large number of on-farm digesters in operation. In Germany, for example, there are more than 4,000 on-farm digesters operating. In Northern Ireland, on-farm AD has the potential to provide additional income to farmers from the sale of renewable energy (mainly electricity) whilst at the same time preserve (or slightly enhance) the fertiliser value of the slurry. At present, information on the performance and economics of on-farm AD in Northern Ireland are unknown. In order to provide this information, AFBI Hillsborough has installed an on-farm anaerobic digester. Reflecting the main type of slurry available for digestion, this digester is using cattle slurry. Data generated from research on this project will provide much needed information for the industry and will assist in informing and developing government policy.

Conclusion

Slurry produced by housed farm livestock in Northern Ireland is a valuable resource both as a fertiliser and as a source of renewable energy.

For further information contact Peter Frost or Stephen Gilkinson

The fertiliser value of pig slurry

Slurry is generally regarded as an unwelcome waste material that must be disposed of. However, unless exported to a neighbour, it can be a valuable source of nutrients on the producing farm and should be incorporated into the nutrient management plan of the farm. This will help to control fertiliser costs and minimise damage to the environment.

Table 1 shows the typical total nitrogen (N), phosphorus (P) and potassium (K) application rates when pig slurries at three different dry matter levels are landspread at a rate of 50 cubic metres per hectare and indicates the corresponding monetary value of the NPK being applied per hectare. The value of the nutrients has been calculated from DARD information on the average prices of the nutrients when purchased in bag fertilisers from January to October 2008.

Table 1: Application rates of total NPK when pig slurries are spread at a rate of 50 cubic metres per hectare and corresponding monetary value of the nutrients applied per hectare

DM %	N	P_2O_5	K_2O	N	P_2O_5	K_2O	Total
	kg/ha			£ Sterling/ha			
2	150	50	100	150	50	30	230
4	200	100	125	200	100	40	340
6	250	150	150	250	150	45	445

These are the maximum nutrient values and these depend on the slurry being applied carefully and at the correct time of year when crops are actively growing and can make use of the nutrients. The fertiliser recommendation for each nutrient can be reduced accordingly to save money.

- Slurry storage capacity should be increased to at least six months so that applications are made during the growing season.
- Application rate should be matched to crop requirements and should never be more than 50 cubic metres per hectare per year.
- Application by bandspreader, trailing shoe or dribble bars or shallow injection will make most efficient use of the nutrients.
- Slurry should be incorporated into arable soils immediately after spreading to get the maximum fertiliser value.
- Total N should not be applied at rates over 170 kg per hectare per year.
- Pig slurry may contain copper and zinc and regularly amended soils should be tested for trace metals.
- Although pig slurries often have a similar high pH to cow slurries, their buffering capacity is lower and, unlike cow slurries, they are not effective as liming materials so acid soils may continue to acidify with regular pig slurry application unless lime is applied.
- Landspreading is still cheaper than other methods of dealing with slurry such as separation or digestion but care must be taken to balance nutrient supply with crop nutrient requirements.
- Always follow the DARD Codes of Good Agricultural Practice.

For further information contact Peter Christie

On-farm biomass energy production and utilisation

The development of biomass energy systems from renewable and sustainable sources is an area of increasing importance for Northern Ireland. At AFBI Hillsborough a new Environment and Renewable Energy centre (EREC) has been developed to allow research into many aspects of this emerging industry and address questions posed by those seeking to diversify their farming activities or trying to develop new income streams from renewable energy. The research carried out at the EREC will also provide a scientific basis from which policy makers can make informed decisions on how Northern Ireland agriculture could contribute to the achievement of renewable energy and greenhouse gas emission targets.

The Environment and Renewable Energy Centre

The key technologies in the EREC are the generation of heat from a range of biomass materials, including short rotation coppice willows and forestry residues, and the generation of electricity and heat from the anaerobic digestion of animal manures.

A combined heat and power unit generates a continuous output of 26 kW electricity utilising the methane rich biogas from the 600 cubic metre mesophilic on-farm digester processing manure from the 300 cow dairy herd. Two biomass boilers, a 320 kW woodchip only boiler and a 120 kW multi-fuel boiler provide hot water for office and farm buildings, the dairy parlour and the woodchip drier via a highly insulated 1.4 km underground heating loop pipe. The woodchip boiler has been running non-stop since commissioning in September 2008 using forest residues and locally supplied SRC willow chips.

The recently installed multi-fuel boiler will shortly be evaluating a range of fuels including; standard woodchips, Miscanthus

(elephant grass), oil-seed rape, SRC willow, and cereals all sourced from within the Hillsborough farm.

EREC research projects

Research projects have been initiated into a wide range of topics related to renewable energy including:

- Maximising the yield of biogas from the anaerobic digestion of animal manures
- Forest brash utilisation as a biomass energy source, involving the collection of forestry residues after harvesting, producing standard size cylindrical bales (3.0 m long x 0.6 m diameter) and chipping these for use in the woodchip boilers
- Cost effective systems for the harvesting, storage and drying of SRC willow
- Farm yard dirty water utilisation for the irrigation of SRC willows
- Growing Miscanthus (Elephant Grass) as an energy crop in Northern Ireland. An investigation of planting and management systems for this fast growing bamboo like tropical grass
- The energy balance and carbon footprint of renewable energy schemes in agriculture, and the carbon footprint of agricultural products such as milk and beef

All of these projects are currently being supported by DARD. AFBI also has strong links with The University of Ulster, with the Queen's University of Belfast and with other research organisations such as Teagasc through which a further range of collaborative research projects are being developed.

For further information contact Lindsay Easson or Greg Forbes

Environmental matters

The Nitrates Directive and Phosphorus Regulations

The Nitrates Action Programme Regulations (NAP) and Phosphorus (Use in Agriculture) Regulations 2006 became effective on 1 January 2007. They have been introduced to improve the use of nutrients (especially nitrogen and phosphorus) on farms and as a result help to improve water quality throughout Northern Ireland.

Measures within these regulations include:

- *Closed spreading periods :* Organic manures (including pig slurry) must not be applied between 15 October and 31 January and chemical nitrogen (bagged fertiliser) must not be applied between 15 September and 31 January.
- *Land application restrictions :* Organic manure spreading exclusion zones and maximum application rates have been set to protect both surface and ground waters.
- *Improved application methods* : Slurry can only be spread by using inverted splashplate, bandspreaders, trailing shoe, trailing hose or soil injection – sludgigator type machines must not be used.
- *Limits on nitrogen from livestock manure* : There is a maximum farm limit of 170 kg N per hectare per year.
- *A minimum slurry storage requirement* : Anyone with at least 10 breeding sow places or 150 finishing pigs is required to have at least 26 weeks storage capacity. Below these levels 22 weeks storage is required.
- *Record keeping :* Good record keeping is essential. Each farmer should know exactly what agricultural area is being farmed and how many pigs and other livestock are on the farm. Details of slurry storage capacity available and slurry imported or exported are also required.

Too much slurry?

There is a considerable land requirement for pig slurry because of the limit for 170 kg of livestock manure nitrogen per hectare. This equates to an area of 0.5 hectares (1.24 acres) of land needed for one breeding sow place and includes suckling pigs, gilts and boars (assuming a 40% replacement rate and 20 finished pigs reared annually). Land requirement will vary according to replacement rate and performance. This land area requirement may mean that slurry cannot all be utilised on the farm of origin. However, its significant fertiliser value means that exporting pig slurry to less intensive farmers can be an attractive proposition as a 2000 gallon tanker of pig slurry is worth approximately £50 at today's fertiliser prices.

Phosphorus regulations

Under this legislation, chemical fertiliser containing phosphorus may only be applied where it can be demonstrated that there is a crop requirement. This means obtaining soil analyses to determine the fertility status of the soil as well as taking the supply of phosphorus available from the application of organic manures into account.

A comprehensive guidance booklet on the Nitrates Action Programme and the Phosphorus Regulations is available from DARD Countryside Management Unit and at www.dardni.gov.uk and www.ni-environment.gov.uk.

The Integrated Pollution Prevention and Control (IPPC) Regulations (Northern Ireland) 2003

These regulations require pig farms with more than 750 sows or more than 2000 production pigs over 30 kg to have a permit to operate. IPPC farms must take steps to prevent pollution or, where this is not possible, minimise it using 'Best Available Techniques'.

'Standard Farming Installation Rules' have been devised to simplify the process of awarding permits to farms and to lower charges where a farmer agrees to operate in accordance with the rules. Issues addressed within the regulations include farm waste management, storage of fuel oil and other raw materials, carcass disposal, animal diet, slurry storage/utilisation and pig housing. Factors such as noise, odour and environmental impact of ammonia emissions also need to be considered.

Further information on PPC Regulations may be obtained from Northern Ireland Environment Agency (NIEA) staff on 028 9056 9296.

CHAPTER 5

WELFARE RESEARCH AND LEGISLATION

Environmental enrichment and tail biting in pigs

Effects of genetics and nutrition on tail biting

Tail biting is a perennial problem which occurs sporadically but which can have costly implications for the producer. Previous research has investigated whether it is possible to either 'breed' or 'feed' tail biting out of pigs.

In a particular trial carried out in England the heritability of tail biting was investigated in Large White and Landrace pigs. Tail biting was found to be heritable in Landrace but not Large White pigs, but was positively related to lean tissue growth rate, and negatively related to back fat levels in Landrace animals. These results suggest that genetically selecting for low tail biting behaviour will not be a viable option.

It has also been suggested that tail biting may be motivated by nutritional factors, in particular mineral deficiencies. Therefore a trial was conducted at AFBI Hillsborough to investigate whether tail biting could be reduced through increasing the salt content of diets offered to finishing pigs. The high salt diet was the same as the control diet except that it contained an additional 15 kg salt per tonne.

The results showed that pigs on the high salt diet drank more water, but did not show a reduction in harmful social behaviours such as tail biting.

Devising the right type of environmental enrichment

It is currently widely thought that the key to reducing tail biting behaviour is to provide appropriate environmental enrichment

in the pen, which will stop the pigs redirecting exploratory behaviour towards penmates. The problem arises when we try to identify environmental enrichment which is appropriate for both the pig and the producer.

From the producers perspective the enrichment must be cheap, must not lead to increased disease risk and must not have a high labour requirement. From the pigs perspective the enrichment must lead to sustained attention, and must allow the pig to perform natural manipulative and chewing behaviours.

It appears that in order for enrichment to sustain a pigs attention it should include characteristics such as being ingestible and destructible. One commercially available enrichment device which is partially destructible is the 'BiteRite' toy. This device includes a cone and plastic rods which the pigs can chew and destroy. However, research has shown that pigs only spend about 1% of their time investigating these toys in comparison to 16% of their time investigating straw bedding, and 9% of time investigating mushroom compost racks.

Another interesting option, however, is the use of suspended ropes. Recent research in England has shown that they lead to sustained attention by pigs, which spend approximately 10% of time exploring the ropes. It is unclear, however, if this increased time spent interacting with ropes will lead to less tail biting behaviour. A large scale trial is currently underway at AFBI Hillsborough to investigate the effect of access to suspended natural fibre ropes on tail biting behaviour in growing and finishing pigs.

For further information contact Niamh O'Connell

High fibre feed for sows

Recent changes to European Union pig welfare legislation mean that pig producers have to provide dry sows with a sufficient quantity of bulky or high fibre food in order to 'satisfy hunger and the need to chew'. These changes are designed to promote sow welfare by reducing levels of aggression and stereotypic behaviours such as sham chewing.

In slatted housing systems there are two possible methods of meeting this requirement:

1. Provide access to a foraging substrate, such as straw, in a rack.
2. Increase the fibre content of the concentrate ration.

Research at AFBI Hillsborough has investigated the effects of these two methods on the welfare of group housed dry sows.

Providing access to a foraging substrate

Two trials were carried out to assess the effects of providing sows with access to grass silage or chopped straw in racks. In both trials the sows were housed in a large dynamic group of approximately 40 animals, and each group had access to two racks. These racks were filled with the substrate (i.e. straw or silage) every morning and evening throughout the trials. In the silage study, sows were offered 1.9 kg silage per sow per day (223 g per kg dry matter), and in the straw study sows were offered 0.2 kg chopped straw per sow per day. In both trials, a second 'control' group of sows, which did not have access to substrate racks, was used for comparison purposes. Sows were replaced in the dynamic groups every three weeks, and each trial lasted for approximately six months.

Welfare assessments (in terms of aggressive and stereotypic behaviour) were made on newly introduced sows during their first two weeks in the dynamic group. In addition, the

farm manager made informal observations of pen cleanliness throughout the trials. A brief summary of results is given in Table 1.

Table 1: Effect of access to silage or straw in racks on sow welfare and pen cleanliness

	Silage	Straw
Aggression	Not reduced	Not reduced
Sham chewing	Reduced	Not reduced
Pen cleanliness	Reduced	Not reduced

Access to silage in racks appeared to improve the welfare of the sows by reducing sham chewing behaviour. However pen cleanliness was reduced in the silage treatment and this may have negative implications for animal health. Neither treatment led to reduced levels of aggressive behaviour. In both studies, there were significant increases in labour requirements associated with having to fill the racks twice a day.

Overall, these results suggest that providing access to foraging substrates in racks may not be a practical or particularly effective method of meeting legislative requirements for bulky or high fibre feed when sows are housed in large groups.

Increasing the fibre content of the concentrate ration

Increasing the fibre content of the concentrate ration is another possible method of meeting legislative requirements for sow welfare. This approach has benefits in terms of not requiring additional labour inputs.

Research at AFBI Hillsborough investigated the effects of feeding low or high fibre concentrate rations (containing 5 or 15% crude fibre respectively) on the welfare of group-housed dry sows. Fibre levels were increased through additional beet pulp and soya hull content.

The results are summarised in Table 2. The use of high fibre diets led to a significant reduction in sham chewing. In addition, sows spent more time lying, less time exploring and more time within kennel areas on high fibre diets.

Table 2: Effect of fibre content of the concentrate ration on the percentage of time spent in different behaviours by dry sows

	Low fibre	High fibre
Sham chewing	29%	7%
Lying	69%	77%
Exploring	30%	22%
In kennel areas	79%	89%

Overall levels of aggression were very low, but there was evidence of reduced aggression in the high fibre treatment.

These results suggest that increasing the fibre content of the concentrate ration reduces hunger among dry sows, resulting in less sham chewing and exploration, and more lying behaviour and use of kennels. Therefore this would appear to be a suitable approach to meeting legislative requirements to provide sows with bulky or high fibre feed.

Unfortunately the sows lost a considerable amount of body condition on the high fibre treatment in this study, which may suggest that fibre levels used were too high. Future research should determine optimum dietary inclusion levels for different sources of fibre that lead to improved welfare without causing weight loss.

For further information contact Niamh O'Connell or Charlotte Stewart

Regrouping strategies for growing and finishing pigs

How important is number of litters per group?
It is well known that mixing unfamiliar pigs together leads to stress and aggression, and that these factors can have a negative effect on growth performance.

However, in many cases mixing growing pigs is unavoidable, and research is required to determine the optimum mixing strategy. A recent study at AFBI Hillsborough investigated whether the number of litters per group influenced productivity and welfare.

Groups of eight pigs were formed from either 1, 2, 3 or 4 litters at weaning, and productivity and welfare were assessed from 4 to 10 weeks of age. The study was replicated eight times using a total of 224 pigs.

The results (Table 1) show that increasing the number of litters per group has significant adverse effects on feed intake and growth rate. In addition, variability in growth rate (between pigs within the group) increased as number of litters per group increased. Injury levels, measured just after mixing, also increased significantly as number of litters per group increased.

In summary, the results show that increasing the number of litters per group has adverse effects on performance and welfare. The magnitude of effects on productivity was quite large, with growth rate being reduced by 9% when groups were formed from 4 litters, rather than from 2 or 3 litters.

Increased variability in growth rate during the growing period with a large number of litters per group could result in more variable slaughter weights.

Table 1: Influence of number of litters per group on productivity and welfare of weaned pigs

	Number of litters per group			
	1	2	3	4
Feed intake (g/day)	847	765	792	744
Growth rate (g/day)	555	516	545	482
Feed conversion ratio	1.53	1.48	1.45	1.54
Growth rate variation	0.11	0.16	0.13	0.20
10-week weight (kg)	31.7	30.3	31.2	28.9
Injury score	2.8	6.6	8.8	9.8

How important is group size and space allowance?
Producers may wish to house more pigs than normal in a pen in the immediate post-weaning period in order to reduce heating requirements.

However, reducing space allowances may have negative effects on production performance. Research carried out at AFBI Hillsborough, investigated four different management regimes for newly-weaned pigs (Table 2). All pigs in the study were weaned at four weeks of age.

The results showed that using small space allowances in the immediate post-weaning period (between 4 and 7 weeks of age) led to reductions in feed intake of approximately 50 g per day during this period. This was shown in groups of both 20 and 40 pigs.

Table 2: Four different management regimes assessed

		Time period	
	Group size	4 to 7 weeks of age	7 to 10 weeks of age
1	20	Small space allowance (0.2 m^2 per pig)	Pen expanded to allow large space allowance (0.4 m^2 per pig)
2	20	Large space allowance (0.4 m^2 per pig)	Large space allowance (0.4 m^2 per pig)
3	40	Small space allowance (0.2 m^2 per pig)	Group split into two pens to allow large space allowance (0.4 m^2 per pig)
4	40	Large space allowance (0.4 m^2 per pig)	Large space allowance (0.4 m^2 per pig)

As a result of low feed intake levels, overall growth rate between four and 10 weeks of age was reduced by 20 g per day when small space allowances were used in the immediate post-weaning period.

These results suggest that overstocking in the immediate post-weaning period should be avoided as it has negative effects of production performance.

Should we split-market groups of pigs?

Split-marketing involves removing some pigs from the group for slaughter before others. The practice is beneficial in that it reduces the risk of overweight animals being sent to the factory. However, removing some pigs may promote aggression in the remaining animals through disrupting their social group. This could potentially lead to reduced performance and meat quality.

French PhD student, Sabine Conte, assessed the effects of split-marketing at the Teagasc Research Centre in Fermoy, Co. Cork, as part of a collaborative project with AFBI Hillsborough and Queen's University, Belfast. The trial involved using 28 groups of 14 pigs. In half of these groups, the three heaviest pigs were removed from the pen for slaughter two weeks before others. In the remaining groups, all animals stayed in the group until slaughter.

The results showed that removing some pigs from the pen earlier than others actually led to a decrease, rather than an increase, in levels of aggression. This may have been related to the increased space allowances that were provided. As expected, variability in carcass weight was reduced by split-marketing, however growth rate and carcass quality were not significantly affected. Analytical work is continuing to assess the effect of this practice on boar taint levels.

For further information contact Niamh O'Connell

On farm pig welfare

Recommendation Report of the EU Scientific Veterinary Committee 30/09/1997:

"The person responsible for pigs should ensure that their welfare, including their health, is safeguarded by the use of appropriate housing, feeding, care, vaccination, preventive medicine and veterinary advice and treatment. Pigs should be inspected daily for signs of poor welfare, such as body condition, movements and postures, condition of skin, eyes, ears, legs, feet, and tail. Other signs of ill health include listlessness, loss of appetite, laboured breathing, excessive salivation, vaginal discharge, frequent coughing, swollen joints, lameness and scouring.

Attention should also be paid to the presence of external parasites, the condition of the faeces and to feed and water consumption".

This statement lays the foundation for welfare standards which should apply to pigs kept for commercial reasons.

Welfare standards for pigs kept on holdings in Northern Ireland are enshrined in local legislation which reflect current EU requirements:

- Welfare of Farmed Animals Regulations (Northern Ireland) 2000.
- Welfare of Farmed Animals (Amendment) Regulations (Northern Ireland) 2003.

In 2006 DARD produced a book containing a Code of Recommendations for the Welfare of Pigs. Any person responsible for, or attending to, pigs is legally required to have access to the code and be familiar with its content. DARD's aim

is to encourage all those who care for pigs to follow the highest standards of husbandry.

The main requirements of the above legislation can be summarised as follows:

1. Inspection

- All pigs must be inspected at least once a day to check that they are in a state of well-being.
- All automated equipment or mechanical equipment must be inspected at least once a day to ensure that these are functioning as required. All defects must be rectified immediately and back-up systems are required where necessary.

2. Accommodation

- Materials used in construction must not be harmful to the pigs and be easily cleansed and disinfected in order to prevent the build-up of disease carrying organisms. Maintenance must be on-going.
- Faeces, urine and uneaten / spilt food must be removed where necessary to minimise smell and attracting vermin.
- Floors must be smooth, non-slip and suitable for the weight of the pigs. There are maximum requirements relating to openings between slats and minimum requirements relating to slat width.
- Air circulation, dust levels, temperature, relative air humidity and gas concentrations must be kept within limits which are not harmful to the pigs.
- Adequate lighting must be available so that the pigs can be inspected at any time.
    - Pigs kept in artificially lit buildings must be provided with light for a minimum period of eight hours per day.
    - Pigs must not be kept without an appropriate period of rest in an artificially lit building.

- The pigs must not be subjected to sudden or constant noise – meal mills should be appropriately sited.
- The accommodation shall be constructed in such a way as to allow each pig to:
    - stand up, lie down and rest without difficulty. Specific pen sizes are required for group housed pigs, i.e. dry sows/gilts, weaners and finishing pigs
    - turn around without difficulty except for the period from seven days before farrowing until the day of weaning
    - have access to clean dry rest areas
    - have enough space to allow it and other pigs in the pen to lie down at the same time
    - see other pigs except when isolated for veterinary reasons and the week before expected farrowing time
- Boar pens must have a floor area of 6 square metres (10 square metres if used for natural service) and be sited where the boar can see, hear and smell other pigs.

3. Feed, water and other substances.

- All pigs must be fed at least once a day.
- All pigs over two weeks of age must have permanent access to fresh drinking water.
- Pigs must be fed a sufficient wholesome diet appropriate to their age and species to maintain them in good health and promote a positive state of well-being.
- Pigs must not be fed anything which may cause them unnecessary suffering or injury.
- Provision must be made for group housed pigs so that each has access to the food at the same time as the others.
- Pregnant pigs must be given high fibre and high energy food to satisfy their hunger and need to chew.

4. Farrowing sows

- Pregnant sows and gilts must be thoroughly cleaned before they are placed in farrowing crates and, where necessary, treated for external and internal parasites.

- If feasible, they must be provided with suitable nesting material the week before farrowing.
- Piglets must be provided with a solid dry comfortable lying area away from the sow and where necessary a source of heat.
- Piglets may be weaned at 21 days provided they are moved to separate 'all in all out' accommodation which is thoroughly cleansed and disinfected between batches. Otherwise they may not be weaned before 28 days.

5. Environmental enrichment

- To enable proper investigation **all** pigs must have permanent access to a sufficient quantity of material **such as straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such** which does not adversely affect the health of the animals.

6. Mutilations

- Castration of male pigs which does not involve the tearing of tissues may be carried out by a veterinary surgeon or by a competent trained operator.
- Tail docking shall only be carried out where there is evidence that injuries to tails have occurred and only after other measures to improve environmental conditions and management systems have been taken in order to prevent tail biting and other vices. Where necessary it must be done by a competent trained operator before the seventh day of life or otherwise by a veterinary surgeon.
- Tooth clipping/grinding shall only be carried out where there is evidence that injuries to sows' teats or other pigs' ears have occurred and only after other measures to improve environmental conditions and management systems have been taken in order to prevent tail biting and other vices. Where necessary it must be done by a competent trained operator before the seventh day of life.

7. Inspections

DARD has to inspect a statistically significant number of pig holdings annually to ensure compliance with EU requirements. From 2009 onwards EU Member States are required to submit a report to the Commission on inspections carried out during the previous calendar year.

Where inspecting officers detect contravention of any provisions in the legislative requirements a written notice will be served on the person in charge of the pigs. The notice will specify action(s) to be taken within a specified time which the officer considers to be reasonably necessary to ensure compliance with the legislation.

Meeting the above welfare requirements is also a Cross Compliance requirement for Single Farm Payment and where deficiencies are detected during inspections penalty deductions may be applied.

A pig reared in a welfare friendly environment is not only a happier pig but a more profitable one!

For further information contact Pat Murray or Abigail Armstrong

CHAPTER 6

DISEASE

Salmonella in pigs

Introduction

The Salmonella organism is able to infect a wide range of animals including man. In man it remains one of the most common causes of food associated gastroenteritis with more than 13,000 confirmed cases within the UK in 2007.

Infection in pigs is also very common. It is estimated that approximately 20% of slaughter pigs in the UK carry Salmonella. However, in pigs, clinical disease is comparatively uncommon. Where disease is seen, the clinical signs range from diarrhoea, dehydration and abortion to, in some cases, death. Often when Salmonella disease is seen it is present in conjunction with other common pig diseases.

The most common type of Salmonella seen in pigs in NI is Salmonella Typhimurium followed by Salmonella Derby and a range of other less frequently isolated types. Salmonella Typhimurium (ST) is a particular concern as it is a common cause of human disease. A number of these outbreaks have been associated with the consumption of pork products. In most cases the ST strains associated with pigs are resistant to a range of antimicrobials and as such when they infect humans pose particular problems to doctors treating human patients.

Therefore on-farm control of Salmonella has a crucial part to play in protecting consumers as well as anyone in direct contact with pigs. The following is a brief outline of some of the approaches that can be used but it must be stressed that it is always advisable to consult a veterinary surgeon with expertise

in pig medicine when putting together a control programme for Salmonella.

Prevention

Key to prevention is avoiding the exposure of pigs to the Salmonella organism. The areas that need to be addressed in attempting to achieve this are listed below.

1. Incoming stock

Probably the single largest risk to the farm is through the introduction of infected stock onto the farm. This can include replacement gilts and boars on a breeding unit or replacement weaners in a finishing unit. Ideally, replacement stock should be bought from a Salmonella free unit. Wherever possible limit the number of sources for replacement stock and investigate the health status of supplier farms. Treat bought-in animals as potential sources of infection to the rest of the herd. It is prudent to use a quarantine system for breeding stock and use different overalls and boots when working with them in order to avoid carriage of the organism to other areas of the farm for the first few weeks following introduction.

2. Visitors

Minimise the number of visitors to the farm to only those who are essential. Vehicles should be parked away from the pig unit and clean overalls and boots dedicated for visitor use should be made available before approaching the farm buildings. Ideally hands should be washed or sanitised before entry into the unit. Feed bins should be accessible without the need for lorries to enter the site. However, all vehicles that have to enter the site should have wheels and wheel arches cleaned and disinfected before entry. Where wheel dips are used these must be kept clean and the disinfectant levels kept topped up. Any equipment brought onto the farm must be cleaned and disinfected before use.

Where mucking out equipment is used e.g. scrapers and brushes, these should be kept clean and individual ones dedicated to particular houses.

3. Wildlife

Both vermin and birds can carry Salmonella onto farms. For vermin, identify the likely problem areas and if necessary request expert help. Where bait traps are used set these up without any bait for several days before putting in bait and do not rely on one or two traps, use sufficient numbers for the size of your farm and the size of the vermin problem. When using bait use enough to kill in one dose and avoid continual baiting as this can lead to bait resistance amongst the mice and rat populations. Do not allow unused food to remain around troughs or hoppers and always store feed in vermin-proof containers. Reduce the number of nesting sites by removing rubbish and weeds in the vicinity of buildings. Bird control can be more difficult but again clean away any used food and consider netting to exclude bird entry into houses. Dogs and cats can be useful at controlling wildlife but they can also carry Salmonella so they should be prevented from direct contact with pigs and prevented from having access to feed bins and hoppers.

Control

Where Salmonella is present on a farm there are a number of approaches that should be followed. No one method is going to completely control infection and realistically for many farms total elimination of infection is likely to be very challenging. However, most farms should be able to significantly reduce the burden of infection on their farms by adopting a range of practices.

1. Farm hygiene

Areas should be regularly cleaned and disinfected. Floors should be scraped to remove gross dirt before washing down. Pen corners and slats should be included in routine cleaning together with partitions, portable equipment and feeders.

Troughs should be emptied and cleaned together with the areas under the troughs. To increase the efficiency of cleaning, use a detergent. Allow the rooms to dry before applying a disinfectant approved to kill Salmonella at the appropriate dilution. It may be worthwhile to consider pre-soaking areas before cleaning to save time and increase the efficiency of cleaning. Clean out water troughs daily and ensure header tanks are clean and covered. When the house is not in use consider flushing the drinking system out. Assess the management of manure handling and storage in order to avoid contamination around buildings where pigs might have access when being moved. Ensure that carcasses are disposed of promptly and that where they are stored is kept clean and vermin-proof.

2. Stock management

'All in all out' systems allow for areas to be rested between batches of animals allowing for an effective cleaning and disinfection system to be used. It also prevents the mixing of different age groups which can be a means of recycling infection throughout the age groups kept on the farm. Where possible batch farrowing should be encouraged as this makes an all in, all out system easier to manage. Poor performing pigs should not be held back and mixed with younger pigs. These together with sick pigs are a potential high risk of infection for other stock. Therefore there should be adequate sick pen space to accommodate these animals. These pens should be isolated from the main pens. Very strict hygiene practices should be used in these areas with 'resting periods' to allow thorough cleaning and disinfection. Dedicated overalls and boots should be used by staff working here as well as clean disinfectant boot dips. All recovered pigs should be kept separate from the rest of the stock.

3. Feed and water

Additional measures involving feed and water are available for control but they should not be seen as a substitute for good farm

hygiene and management. Coarsely ground rations can reduce Salmonella levels in pigs when compared to pelleted feed. This is probably due to the food remaining in the stomach for longer where the stomach acid can kill a larger proportion of any Salmonella organism ingested. Also, liquid feeding can reduce Salmonella in pigs compared to dry feeds due probably to the acidity of the feed.

In some cases the use of organic acids in feed or in water is known to reduce Salmonella infection. They appear to have general 'gut health' benefits and on a number of farms their use has been shown to be a useful aid to Salmonella management. However there are significant direct and indirect costs associated with their use particularly the long term effects on metal pipe-work and drinkers which should be considered before adopting their use.

The future

Salmonella remains a significant cause of human illness and in response to this a series of National Control Plans are being implemented covering poultry and pigs throughout the European Union.

It is expected that targets for reducing the levels of Salmonella in pigs will be set shortly with control plans designed to enable industry to meet these targets. Meeting them is likely to be challenging and will require a range of approaches tailored to individual farm circumstances.

There is available a large range of material produced to help all involved in Salmonella Control in pigs. The following is a brief list of material freely available:

Serious about Salmonella – Back to Basics. A DVD produced by the Food Standards Agency. Contact vetpublichealth@foodstandards.gsi.gov.uk

Code of Practice for the Prevention and Control of Salmonella on Pig Farms.
Available at www.dardni.gov.uk/code-of-practice.pdf
BPEX Salmonella Zoonoses Website.
Available at www.bpex-zap.org.uk/zncp/

For further information contact Sam Strain

Porcine Circovirus Disease: An update

Introduction

Porcine circovirus 2 (PCV2) has been associated with a number of severe disease syndromes in pigs, including post-weaning multisystemic wasting syndrome (PMWS). It has been estimated that PMWS and PCV2-associated diseases cost European producers between 562 and 900 million Euros each year. The Virology Department at VSD (AFBI) has been at the forefront of research into PCV2-associated diseases for the last 10 years and the recent successful development of control strategies.

The disease as it is now

PCV2 is found worldwide and very few herds are currently PCV2-free. Recent surveys have shown that the prevalence of PMWS and PCV2 associated diseases still continues to be high in all parts of the world. Wasting disease still appears to be a predominant clinical sign. However, the manifestations of the disease appears to have evolved. During 2003-2004 a natural switch in the genetic makeup of PCV2 occurred all over the world creating an 'old' genotype and a 'new' one.

In 1995, PMWS was the syndrome described as having typical clinical signs such as progressive emaciation, enlarged palpable lymph nodes, respiratory disease, paleness, and icterus. Mortality rates peaked at 35-40% on average, and occurred mainly between six and 14 weeks of age. Currently, mortality appears between six to 20 weeks of age or later and clinical signs can be delayed and less distinctive. In the past, characteristic gross lesions could often be found in the same pig. More recently, in most countries, an increased variability in the sizes of the pigs and in the number of non-marketable pigs has been seen. Decreases in average daily weight gains and feed efficiency, respiratory and digestive disorders which do not respond to antibiotic treatments are now seen with more

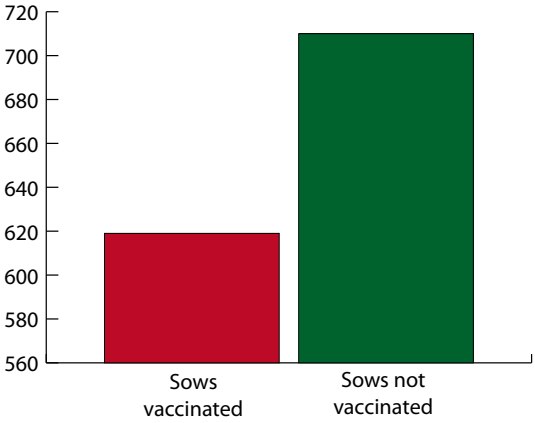
scattered and discrete signs of typical PMWS.

Exposure of piglets to significant PCV2 challenge levels appears to occur very early in life. It has been shown that PCV2 infection reduces the ability of the pigs immune system to fight disease. In acute cases the immune system collapses and the infected pigs become highly susceptible to other common diseases. Therefore it is not surprising that PCV2 infection is characterised by the variety of clinical signs described above.

Control: Sow vaccination

Vaccination of sow herds with PCV2 vaccine has resulted in a marked improvement on their health and economic status. In particular, these herds have observed a decrease in PCV2-linked mortalities, a decrease in the use of medications, especially antibiotics, and a significant increase of almost 100 g per day in average daily gain from weaning to slaughter (Figure 1).

Figure 1: PCV2 sow vaccine – impact on growth performance from weaning to slaughter (French study)



Veterinarians and farmers have also reported positive effects on reproductive parameters. In two large studies 34 Danish herds (14,510 sows) and 277 German herds (64,062 sows) were examined. In these farms, sow vaccination was initiated

following a PMWS/PCV2 diagnosis in the offspring. The number of piglets weaned per sow per year returned to normal levels by being significantly increased by 1.23 and 1.13 piglets in the Danish and German herds respectively. These results bring to light the role played by PCV2 in field reproductive failure and confirm the benefit of the use of sow vaccine.

Control: Piglet vaccination

Piglet vaccination for the control of PCV2-associated diseases has also been shown to be effective. A large field study in North America using 4000 piglets within the same herd which had had PMWS for 18 months has demonstrated protection right throughout the finishing period after using the piglet vaccine. On the farm the losses usually started when pigs were nine weeks of age. In the trial half of the pigs were vaccinated at either approximately 8, 7, 5 or 3 weeks of age and the other half were unvaccinated. The vaccinated groups were penned separately from the unvaccinated groups. There was a significant reduction in mortality from 9.5 per cent to 2.4 per cent. Furthermore, piglets vaccinated at 3 weeks of age were protected equally well as those vaccinated at later ages.

Nutritional intervention

Within our PCV2-associated diseases EU consortium we have also examined if nutritional intervention can be used as a form of control. In a number of experiments, weaned piglets with PCV2-associated diseases were mixed with 'clean' piglets from units which never had PCV2-associated diseases. Piglets were then offered a normal diet or a diet supplemented with 'DeviGuard' (a product with a specific mix of encapsulated fatty acids). The 'clean' pigs that were mixed with the infected pigs started to excrete PCV2 within 24 hours of mixing. However the 'clean' pigs that were offered the diet supplemented with DeviGuard excreted less virus within three to four days of mixing compared to the 'clean' pigs offered the normal diet. In a different experiment, pigs on the same herd were offered both

a DeviGuard supplemented diet and were vaccinated for PCV2. Pigs that received DeviGuard and the vaccine had a reduced mortality and improved growth rate compared to pigs on this unit before it became infected (Table 1).

Table 1: DeviGuard vs DeviGuard + Vaccine

	Pre PMWS (2400 pigs)	Post PMWS (8000 pigs)	Post PMWS + DeviGuard (9200 pigs)	Post PMWS + DeviGuard + vaccine (8400 pigs)
Mortality (%)	1.39	5.61	1.88	0.88
Stage 1 weight (kg)	20.03	17.75	21.68	22.40
Stage 2 weight (kg)	40.47	36.49	42.71	45.44

Conclusion

It is now confirmed from laboratory and field trials that vaccination against PCV2 infection can provide protection against the development of PMWS. Improvements in growth and reproductive performance due to vaccination have been dramatic in many cases. It is therefore suspected that there may have been a chronic involvement of PCV2 in many herds prior to any PMWS outbreaks. Nutritional intervention has also been shown experimentally and in the field to be an effective control measure for PCV2 associated diseases, especially in combination with vaccination where the two procedures were found to be synergistic.

For further information contact Gordon Allan or Violet Beattie

What use is all this information?

Northern Ireland pig producers, their veterinary practitioners and development advisors, can now examine data collected at the abattoir each time pigs are sent for slaughter via Aphis on-line. This includes ante and post-mortem findings which can be analysed and used to assist the assessment of herd health and the formulation of herd management strategy.

Some of the common conditions recorded in a survey of 9,617 pigs presented for slaughter in 2009 are detailed in Figures 1 and 2.

Figure 1: Reasons for whole carcass condemnations across 9617 pigs presented for slaughter in 2009

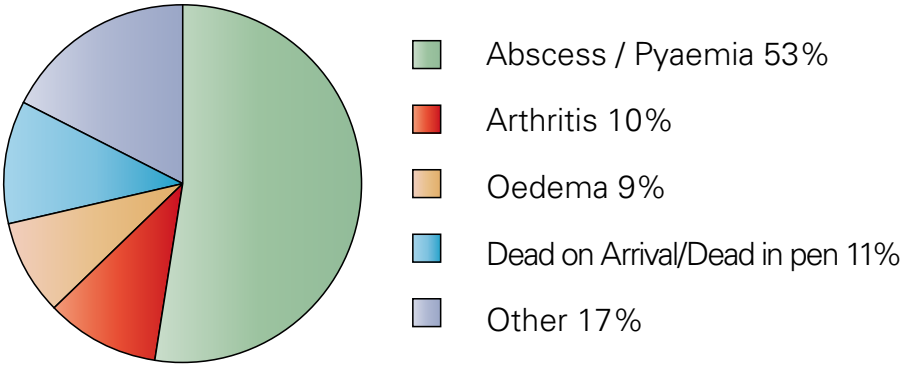
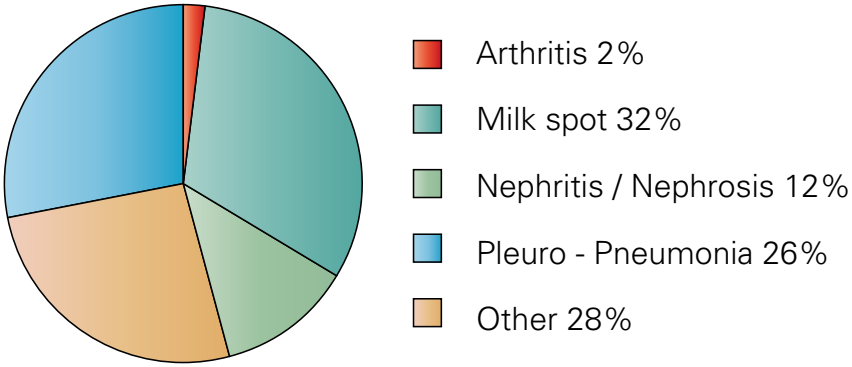
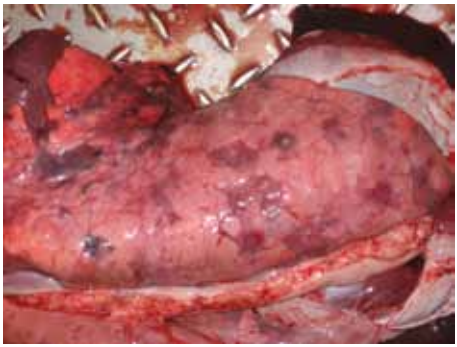


Figure 2: Reasons for all condemnations across 9617 pigs presented for slaughter in 2009



Abscess/pyaemia (literally pus in the blood) accounts for 53% of all carcasses totally condemned. This condition results from bacteria entering wounds or abrasions; by far the most common cause is tail biting. In general, if you have a high level of tail biting in your herd you will have a high level of condemnations for abscess/pyaemia and vice versa (Pictures below). By the time the pig is slaughtered the initial injury to the tail may have completely healed. Tail biting is a difficult behaviour to modify and your veterinary surgeon will be able to advise you on strategies to reduce its occurrence. A less common but important factor in pyaemia is foot lesions caused by damaged or poorly designed slats.



Left: Healed tail bite. Right: Lung abscesses in pyaemic pig seen in picture on the left

Arthritis is a common problem in growing pigs and is usually caused by either respiratory infection or trauma which allows bacteria to enter the body. Causes of trauma include abrasions from rough flooring and poor hygiene when docking tails and clipping teeth.

Pneumonia is recorded as localised or generalised indicating the extent to which the lungs are affected by the condition. As pneumonia is a complex disease in pigs, with a range of causes and varied interactions between them, it will need detailed

investigation by your veterinary practitioner to arrive at a suitable control strategy. However, the meat inspection findings may reveal the first signs of infection unrecognised in the live pigs or can be used to monitor the effectiveness and progress of a batch of pigs previously under treatment for a respiratory problem.

Oedema is the accumulation of fluid within the tissues and it has a number of possible causes; the most commonly seen in the abattoir are poor or emaciated animals which have a lack of protein in the bloodstream. These animals are often in poor condition because of pre-existing arthritis or pneumonia. Pigs in good condition with acute PDNS (porcine dermatitis and nephropathy syndrome) may also be oedematous.

'Milk spot' is scarring in the liver caused by migration of the larvae of the parasite *Ascaris suum* and is recorded as localised (liver can be trimmed) or generalised (whole liver rejection). However, the damage caused by this common parasite (32% of all condemnations) is not confined to the liver; the larvae migrate through the lungs before returning to the gut where they mature. Migrating larvae cause direct physical damage to the lungs and compromise the effectiveness of enzootic pneumonia vaccination – there is a positive correlation between milk spots on the liver and respiratory problems in the fattening house.

Large numbers of worms in the intestine absorb food and interfere with digestion. Feed conversion efficiency and growth rate can be reduced by up to 10% - who can afford this waste?

A good deworming strategy coupled with 'all in all out' management and thorough cleaning of housing is important to reduce these losses.

Porcine Stress Syndrome (PSS) is a complex of conditions common in some herds. It is a genetic mutation associated with heavily muscled or lean breeds causing tremor, rigidity and sudden death. PSS will be recorded in the ante-mortem findings; these pigs are often seen at unloading and are slaughtered immediately. The majority of the DOA (dead on arrival) and DIP (dead in pen) pigs can be attributed to PSS, as well as a number of ill bled pigs at post-mortem inspection. Stress is the trigger for this condition and any measures which can reduce stress caused by e.g. mixing, fighting, high temperatures or poor ventilation will help to reduce this problem. Intractable problems with PSS may require a change in breeding strategy.

Nephritis/nephrosis are conditions of the kidneys and have many causes – viral, bacterial, toxic, genetic etc. They do not usually lead to whole carcass rejections, with the exception of PDNS.

The DARD meat inspection team at the abattoir endeavour to ensure that data are recorded as accurately as possible and will be happy to discuss results with you, if required. You can assist their efforts by ensuring that pigs are clearly slap marked and transported separately from other batches.

For further information contact Jim McAlister and William Gilmore

Pig identification, registration and movement

- To facilitate the swift eradication and minimise the spread of notifiable diseases, such as Foot and Mouth Disease, Swine Fever and Aujeszky's Disease, **it is essential that all pig movements can be traced** by the Department of Agriculture and Rural Development.
- All premises in Northern Ireland on which pigs (including pet pigs) are kept must have the holding **registered** with DARD. On registration, a holding code is allocated to each premises.
- All pigs on a holding must be **identified** correctly **before leaving** the holding or when they **attain six months of age**, whichever is sooner.
  - **Pigs over six months** must be identified by an ear tag, ear tattoo or a slap mark bearing the **holding code and an individual number** or they can be **slap marked** with the holding code and **tagged** with an **individual number.**
  - **Pigs under six months** moving off a holding to another holding must be identified by an ear tag, an ear tattoo, or a slap mark bearing the **holding code.**
  - **Finished pigs moving directly to slaughter** from premises of origin to an abattoir in NI are usually identified by a slap mark. This may be the **holding code** or a **curer number** which has been notified to DARD. The slap mark must be applied before the pigs leave the holding and be legible.

- All pigs moving onto or off a holding must be identified correctly and be accompanied by a **movement document.** This includes, for example, the sale of weaners, finishers, breeding gilts, cull sows and the movements associated with boar sharing.
  - On request, serial numbered book of movement documents are issued to registered holdings from local Divisional Veterinary Offices. These documents are for the sole use of the holding to which they have been issued.

- The books contain carbonated triplicate copies of each movement declaration for each movement off a holding. The **original** document accompanies the pig(s) and should be retained by the buyer for a period of one year.
- The **first copy** should be forwarded to the holding's local Divisional Veterinary Office and the **second copy** should be retained by the seller for a period of one year.

- **A herd record/register** should be maintained of all pig movements/births/deaths in a permanent and legible form and be retained for a period of three years. **Herd register books are available from local Divisional Veterinary Offices (or see contacts below).**

A herd record should contain the following details with regard to each holding:

Identification mark (plus any individual identification)	Number, breed + description of animal(s)	Date of birth/ purchase	Name and address of seller/ purchaser/ market/ slaughterhouse	Date sold/ disposed of/ died	No of animals present on the holding

The record must be updated within 48 hours of the acquisition, sale, disposal, birth, death or re-identification of pigs.

The above requirements are in compliance with: Aujeszky's Disease Order (Northern Ireland) 1994, Aujeszky's Disease Scheme Order (Northern Ireland) 1994 and Animals (Records) Order (Northern Ireland) 1997.

Failure to meet the standards of the Cross-Compliance Statutory Management Requirements (SMR 6) with regards pig identification, registration and movement may result in the reduction of direct support payments.

For further information contact Abigail Armstrong or Pat Murray

APHIS in the Northern Ireland pig industry

The reputation of APHIS in the NI beef industry is long standing – from the early days of "illegal growth promoters" through "BSE" and right up until "dioxins" in 2009. The world-class cattle traceability system has linked and supported every part of the beef production and marketing process. APHIS's involvement is wide-ranging – from the first registration of the calf at birth, through assurance of its Farm Quality and display of Export Eligibility in markets; to the carcass's suitability for discerning customers and niche meat markets.

The good news is that the power of APHIS is now increasingly available to the NI pig industry. Now, in 2009, for the first time, most of the significant elements of pig production are being recorded, transmitted and made available for analysis across the industry, via the system – e.g.

- Meat plants record the ante- and post-mortem findings of the pigs presented for slaughter.
- Farmers can check out and interpret this information from their home PC via Aphis-on-Line.
- Veterinary practices can also check out client's slaughter information and access typical pictures of conditions.
- Development advisers can access post-mortem information "on line" from their offices or the farm-yard.
- "Non-line" farmers can obtain their information from their Pig Development adviser or veterinary practice.
- Meat Plant operators can use this information to assess the health record of any potential supplier/producer.
- Veterinary practices can now access their herds' Aujeszky's Disease information from their practice PC.
- Aujeszky's Disease results are now available directly in the practice PC, or on the farm (via A-o-L).
- Farm Census information can be corroborated - and may one day be replaced – by the annual Aujeszky's audit.

- Stocking density information is supplied to NIEA Inspectors to reduce the impact on farmers of inspections.
- Stocking levels are supplied directly, or via agents, e.g. the UFU to help farmers prepare for such inspections.

How does APHIS work?

APHIS is built, maintained and paid for by DARD as part of its commitment to animal and public health, and to ensure compliance with EC legislation. However to ensure that the industry benefits as much as possible from this valuable resource, as much information as possible is now being made available to farmers, processors etc.

APHIS is the database of all animal keepers. Built around this are all the elements necessary for disease control – e.g. movement recording, tracing, vaccination and test result recording. In addition, DARD Meat Inspectors record all ante- and post-mortem findings in real time on specially designed terminals on the factory floor. This information is then uploaded onto the database, from where it can be accessed securely by those with rights to see it – e.g. the farmer, his development adviser, his veterinary practice, and the meat plant(s) he supplies - over the internet via a secure and password protected log-on.

For the future, it is likely that the focus will be on increased North-South data transmission particularly perhaps around the recording of animal medicines and treatments. The ability to access the system direct from veterinary practices, on farms and in meat plant lairages and veterinary offices means that there is fantastic potential to record information on treatments once – but use it, efficiently, wherever it is needed.

For further information contact David Torrens

CHAPTER 7

CARCASS AND MEAT QUALITY

PiGIS in practice

At the last Northern Ireland Pig Event the Pig Grading Information System (PiGIS) was very much in its infancy and a prototype of the system was demonstrated. We have come a long way since then! Currently over 80 pig producers are using PiGIS on-line to help make informed management decisions, with others receiving paper reports from their slaughter plant or Pig Technologist. Staff at the slaughter plants also rely on PiGIS to identify which customers supply high quality carcasses on a regular basis.

What has PiGIS delivered?

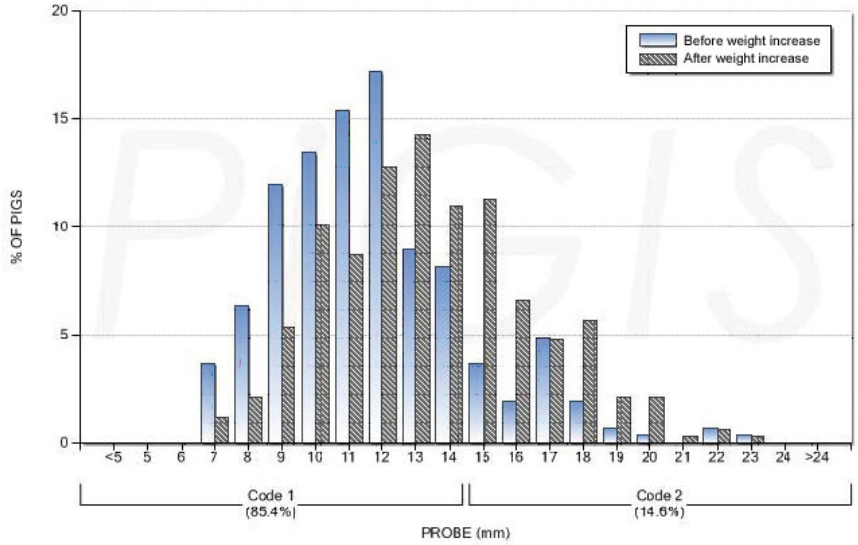
The simplicity of PiGIS has ensured that pig producers quickly adopted and used the system to assess the quality of their pig carcasses. PiGIS has helped individuals and groups negotiate contracts and market pigs to best effect. With increasing confidence, producers are now using PiGIS as a tool to quantify how management changes on the unit affect carcass quality. A few of these are discussed below.

Slaughter weight effects

The most obvious factor affecting carcass quality is slaughter weight. This is very relevant at present as heavy slaughter weight contracts are available. On one farm the producer made the conscious decision to increase average carcass weight from 85 kg to 90 kg. The resultant increase in backfat was much greater than expected as shown in Figure 1. The heavier pigs resulted in a 1.5 mm increase in average probe, with the percentage of pigs achieving "Grade 1" in a 14 mm P_2 contract reducing from 85% to 65%. Needless to say when the

producer assessed the increase in backfat level using PiGIS he immediately reduced slaughter weight by selling two weeks pigs the following week!

Figure 1: Effect of increasing slaughter weight on fat depths



Summary Information

		Alt Date
Number Of Pigs:	268	336
Rank:	-	-
Code 1	85.4%	65.7%
Code 2	14.6%	34.3%
Average Probe:	11.8 mm	13.5 mm
Probe Variability:	2.88	3.04
Condemned[1]:	0.4%	0.3%

Breed effects

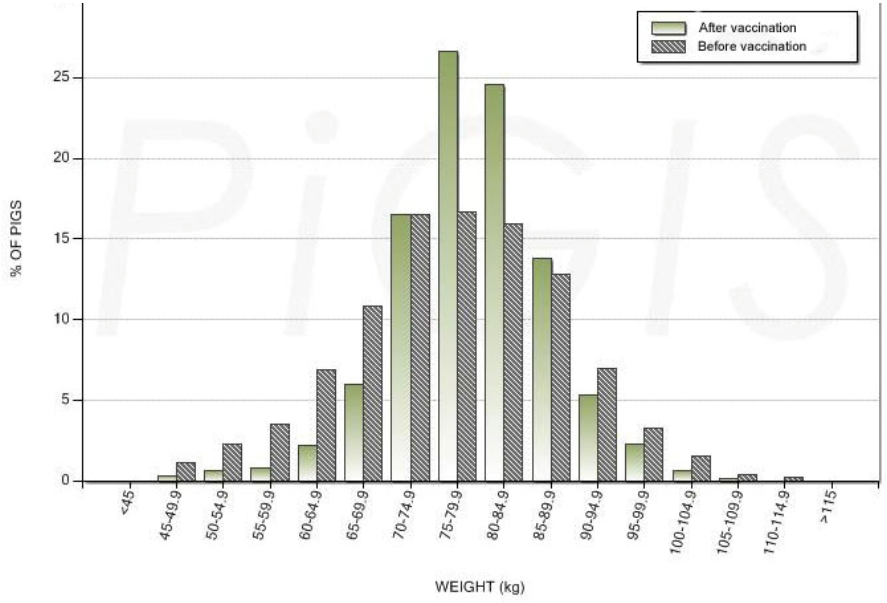
In this case, the producer operated two separate birth-to-bacon pig units. Although on different sites, the genetics, rations fed, health status and management on both units were identical. The only difference was that sows were inseminated with different semen, one used the more traditional Landrace type boar, the other a meat-line sire supplied by a large breeding company. The

PiGIS results were extremely interesting with P_2 measurements from one unit being on average 1 mm less than the second unit at the same carcass weight. Also, the leaner pigs were more uniform in both weight and probe measurement. This resulted in almost 10% more of the pigs classed as "Grade 1" and achieving a higher price. This information, in conjunction with Pig Benchmarking figures on feed conversion, allowed the producer to make informed decisions on future breeding programmes.

Herd health

PMWS or "wasting disease" has reaped havoc on many units in our industry. On one unit the situation reduced pig growth to such an extent that 15% of pigs were sold below a carcass weight of 65 kg. The introduction of a vaccination programme for wasting disease had a dramatic effect on growth rate, reducing average age at slaughter by an estimated 10 days. Figure 2 shows that the proportion of slow growing "under weight" pigs marketed was greatly reduced. This was due to the increase in growth rate.

Figure 2: Effect of vaccination of proportion of under weight pigs



Also the proportion of carcasses in the 65 kg to 92 kg weight band increased from 70% to 85%, with no effect on the proportion of over-weight pigs. This improvement in carcass quality alone more than compensated for the cost of the vaccination programme!

PiGIS is now a proven tool, helping to give better returns to producers and processers. Like any tool, it is only beneficial when used. So don't leave PiGIS on the shelf.

For further information contact Mark Hawe

Does average daily gain affect meat quality?

The meat quality of pigs can be highly variable in terms of tenderness. It is speculated that its inconsistency regarding tenderness is one reason why pork has a smaller market share in comparison with beef and chicken.

It is also well known that the average daily gain of pigs can be highly variable. Research linking on-farm practices to the meat and eating quality of pork is essential to identify if opportunities exist for producers to improve the eating quality of their product. The following trial investigated the relationship between the average daily gain of pigs taken from the research herd at Hillsborough and the tenderness of the resultant pork.

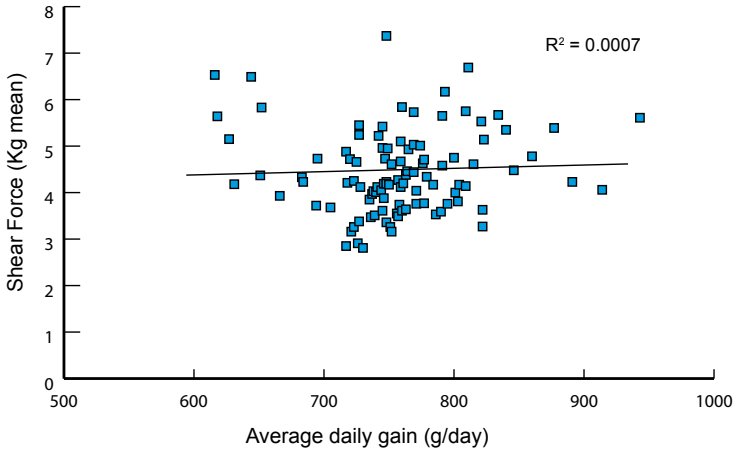
Research

A total of 103 Landrace x Large White pigs were sent for slaughter at a target weight of 105 kg. The average daily gain of the pigs spanned a range from 650 to 900 g per day between weaning and finish. There was no relationship between the average daily gain of pigs between weaning and finish and shear force (tenderness) (Figure 1).

Therefore, the variation in average daily gain observed in this study which encompasses the vast majority of pigs in the commercial industry, did not explain the variation in shear force (tenderness) observed in the pork. The shear force (tenderness) and colour of the meat was similar between boars and gilts.

Further analysis indicated that the backfat depth of pigs (at P_2) played a more significant role in determining the quality of the meat than average daily gain, weight at 20 weeks of age or sex.

Figure 1: Relationship between average dairy gain (weaning to finish) and shear force (tenderness)



Conclusion

The pigs used in this study were generally classed as fast growing Landrace x Large White pigs. The range in growth rate would be representative of many pigs being sent for slaughter in Northern Ireland. It can be concluded that the variation in growth rate observed in this study did not explain the variation in meat quality of the resultant pork. Back fat depth was found to have a more significant role when determining meat quality parameters than average daily gain, the weight of pigs at different ages or the sex of the pig.

This study was jointly funded by DARD and the British Pig Executive

For further information contact Elizabeth Magowan or Bruce Moss

Influence of breed and slaughter weight on meat quality

In a previous article within this booklet the production performance of pigs representing different sire line breeds – Landrace, Pietrain Belgium, Pietrain Austrian and Tempo was found to be very different. The meat quality from a representative sub-sample of these pigs (144 in total) was also compared. Twelve pigs (six boars and six gilts) within each sire line breed were taken to one of three slaughter weights – 95, 105 or 115 kg. These slaughter weights represented carcass weights of approximately 72, 80 and 87 kg.

Instrumental measures of ultimate pH, drip loss, colour, cooking loss and Warner Bratzler Shear force at seven days post slaughter were taken to assess meat quality.

How did sire line breed and slaughter weight affect meat quality?

Meat with a 'high' or 'low' ultimate pH normally is classed as 'DFD' (dry, firm dark) or 'PSE' (pale soft exudative) respectively and is considered of poorer quality. The ultimate pH of all pigs in this study was within the acceptable range (average 5.48), (Table 1). There were no differences in ultimate pH of any practical significance due to breed or slaughter weight (Tables 1 and 2).

However, the rate of decline of pH post slaughter also affects meat quality. Stress sensitive breeds of pigs, which have fast rates of pH decline have a higher incidence of 'PSE' meat. In this study the Pietrain Austrian had the highest drip loss (more exudative) and highest lightness values (L*) i.e. were palest (Table 1). The Tempo breed had the lowest drip loss and lowest lightness values.

Table 1: Effect of breed on meat quality

	Landrace	Pietrain (Austrian)	Pietrain (Belgium)	Tempo
Drip loss %	6.37	6.81	6.28	5.76
Ultimate pH	5.47	5.46	5.47	5.51
L* (lightness)	53.1	54.3	52.8	52.6
a* (redness)	1.6	2.2	2.4	2.6
b* (yellowness)	7.4	8.4	7.9	7.8
Cooking loss %	28.9	27.8	28.3	27.9
Shear force (kg)	4.03	4.26	4.26	4.04

How did slaughter weight affect meat quality?
There was some indication that drip loss increased with slaughter weight. Chops from pigs with a slaughter weight of 95 kg lost 5.7% of lean weight through drip loss, chops from 105 kg pigs lost 6.2% and chops from 115 kg pigs lost 7.1% (Table 2). Visible drip loss in retail packs of pork chops can lead to complete rejection of the packs by the consumer. This increased drip loss with slaughter weight may be related to the slower chilling rate due to greater bulk of carcass at the higher weights. Although there was a tendency for cooking loss to increase with slaughter weight, there was no marked effect of slaughter weight on shear force values.

Overall mean shear force values were relatively high. If we assume that the relationship between shear force and acceptability is similar for pork as for beef then a shear force of 4 kg, as found in this study, would be considered acceptable by only 60% of consumers. Both the reason for the relatively high shear force values and the relationship between shear force and acceptability of pork need further research.

Table 2: Effect of slaughter weight on meat quality.

	Target weight group:		
	95 kg	105 kg	115 kg
Drip loss %	5.72	6.20	6.99
Ultimate pH	5.48	5.48	5.47
L* (lightness)	53.3	52.3	54.2
a* (redness)	1.8	2.2	2.6
b* (yellowness)	7.7	7.7	8.1
Cooking loss %	29.3	28.6	26.7
Shear force (kg)	4.23	4.08	4.13

This study was jointly funded by DARD and the British Pig Executive

For further information contact Bruce Moss or Elizabeth Magowan

Breeding healthy pork

Consumers are becoming increasingly aware of the need to consume a higher proportion of 'healthy' fatty acids e.g. omega 3 fatty acids and in particular long chain polyunsaturated fatty acids like DHA and EPA. The diet of the pig can be altered to readjust the fatty acid profile of pork and increase the proportion of omega 3 fatty acids. However, this dietary manipulation carries a cost which consumers rarely want to pay. In a small trial at AFBI, pork from different sire line breeds was compared to evaluate if breed could influence the fatty acid profile.

Results

The lean tissue of pork chops from Pietrain Belgium and Tempo pigs had a lower saturated and higher unsaturated fatty acid content than that of Pietrain Austrian or Landrace pigs (Table 1). Pietrain Belgium pigs also has the highest proportion of omega 3 fatty acids, and in particular the long chain polyunsaturated fatty acids, for example, DHA and EPA.

Table 1: The effect of terminal sire breed on the fatty acid profile (% of total fatty acids) of lean tissue in pork chops

Fatty acids:	Landrace	Pietrain (Austrian)	Pietrain (Belgium)	Tempo
Total unsaturated	58.9	59.0	61.0	60.5
Total saturated	41.2	41.0	39.0	39.5
Total omega 3	1.47	1.48	1.68	1.43
Total omega 6	15.0	15.7	17.7	14.7
Long chain polyunsaturated omega 3	0.29	0.31	0.41	0.30
Long chain polyunsaturated omega 6	2.12	2.24	2.54	2.08

This work suggests that breed can have a significant effect on the fatty acid profile of pork. It appears that different breeds have different abilities to 'manufacture' these long chain polyunsaturated fatty acids within their lean tissue. It may therefore be possible to breed pigs with a 'healthy' fatty acid profile. In addition, dietary manipulation may be more effective when used with Pietrain Belgium pigs compared with Landrace pigs.

For further information contact Elizabeth Magowan

Food processing for farm businesses

Increasing demands for fresh, locally produced, quality food products by today's discerning customers have led to a growing interest by producers to add value to their farm produce through on-farm processing and retailing.

Market trends indicate an increased consumer interest and knowledge in pesticide usage, animal husbandry, animal welfare, traceability, carbon foot prints and product origin along with an increased interest in local food.

A number of key issues need to be considered for farm diversification into food processing such as factors contributing to successful business planning, the requirements for registration and approval, and best practice in design of on-farm food premises. At the outset attention must be given to the product portfolio in terms of unique point of difference, shelf-life, seasonality, level of processing required and the necessary volume. The latter will affect the size and scale of the operation required and will assist in premises considerations such as location, new build versus conversion, planning permission and room for future development. A variety of routes to market must also be considered including, farm shop, farmers markets, service sector, internet sales and box schemes. Assessment of all these factors is required to maximise potential new business opportunities.

CAFRE technologists from Loughry will present information on the pig carcass breakdown highlighting potential end uses for different cuts. The manufacturing requirements involved in the production of cured products such as bacon and other uncured products e.g. sausages will also be highlighted.

For further information contact Julie Ann Moorehead

Supply Chain Development

Supply Chain Development Branch, DARD offers help and support to those involved in agri-food supply chains and farm diversification businesses. We aim to improve business development by providing advice and by utilising a range of programmes offered within the NI Rural Development Programme 2007-13.

Supply Chain Development Programme

The Supply Chain Development Programme aims to improve the effectiveness and sustainability of agri-food and forestry supply chains by facilitating groups wishing to develop supply chain initiatives and relationships.

It is available to groups comprising two or more businesses. Groups must consist of farmers/growers but may also include processors and/or other suppliers of agriculture, horticulture or forestry produce.

Successful applicants can avail of up to 50 days assistance from a facilitator. This is available at up to five days per month and can include a proportion of specialist input.

The Supply Chain Development Programme can also provide assistance with training, business efficiency measurement tools and support towards the professional costs of group consolidation.

- Agricultural and Forestry Marketing Development Grant Scheme
- Agricultural and Forestry Processing and Marketing Grant Scheme

There are two further schemes that share the aim of improving the economic performance and international competitiveness of the agri-food and forestry sectors. These are open to agri-food businesses up to intermediate size. In the case of forestry,

support is limited to micro enterprises. The level of grant aid will vary depending on the size of the enterprise. The maximum grant payable is at a rate of 40% of eligible costs.

The Marketing and Development Grant Scheme is focused on improving the marketing capability of agri-food and forestry businesses.

Examples of projects that can be funded include feasibility studies into market focused initiatives, staff costs to implement marketing and new quality assurance systems.

Funding is available up to £150,000.

Applicants may be individuals or groups of primary producers, food processors, trade associations or industry bodies.

The Agricultural and Forestry Processing and Marketing Grant Scheme is focused on funding capital investment projects that best meet the specific aims of the programme.

The scheme is open to processors, groups of primary producers who market their produce collaboratively and individuals who want to process and market their own produce.

Funding is available up to £500,000. In the case of forestry applications funding is available up to £130,000.

Projects must primarily (at least 90%) concern the processing and/or marketing of primary agricultural products or forestry products covered by Annex 1 to the Treaty of Rome.

For further information contact Charlotte Moore or Sean McIntyre

CHAPTER 8

INDUSTRY SUPPORT BODIES

Ulster Farmers' Union- pig policy update

Environmental legislation
Integrated Pollution Prevention and Control (IPPC) is a major piece of environmental legislation that will have a significant impact on Northern Ireland's pig and poultry industries. The requirements for IPPC were set out in 1996 in EU Council Directive 96/61 and the purpose of this legislation is "to achieve integrated prevention and control of pollution in order to achieve a high level of protection of the environment as a whole".

Key concerns
- The commission is proposing that the new IPPC rules use nitrogen equivalent rates to calculate IPPC thresholds therefore encompassing any producer with over 150 sows.
- Pig producers would have to find third parties with suitable land (P index less than two) to spread slurry on and soil test this land to prove it is suitable.
- On-farm feed mills capable of milling more than three tonne per hour would be included in the directive.

The IPPC regulations go beyond the Nitrates and Phosphorus Regulations requiring full nutrient management plans to be drawn up for organic manures spread on farmers own land and for that spread on farmers land where the organic manures have been exported to.

We believe the Commission has missed an opportunity to evaluate whether the regulation of farms under IPPC provides any additional environmental protection above that achieved

via other mechanisms, such as the designation of Nitrogen Vulnerable Zones, the Climate Change Levy, Codes of Good Farming Practice, Quality Assurance Schemes and various forms of control imposed by Member States, local government and the retail chain. The changes contained within this proposal come very shortly after the phasing in of the poultry and pig sectors into IPPC in early 2007 and therefore certainly too soon to evaluate the effectiveness of the current measures.

UFU continue to question to what extent these new requirements will add benefit to the environment. Contrary to the aim of reducing the burden of regulation, the Commission, in proposing these changes will increase that burden by adding new requirements and reducing flexibility.

The UFU successfully lobbied 40 MEP's to table amendments to remove the new proposals. Unfortunately these amendments were rejected by the European parliament. The UFU then took their case to Sammy Wilson MP asking him to lobby DEFRA Environment Minister to vote against the proposed changes when the European Council met on 25th June.

Result - At the meeting in Luxembourg, Environment Ministers reached "political agreement", marking the end of the first stage of EU negotiations, by agreeing not to extend the scope of the IPPC controls. A significant number of small family farm businesses stood to be affected and 18 months of lobbying by the UFU has paid dividends, sparing pig producers here from this bureaucratic nightmare.

The legislation will be reviewed in 2012 and the UFU will be lobbying hard to ensure these proposals are not reintroduced. The UFU continue to lobby for those members currently operating within the IPPC threshold to ensure that the requirements for permit holders here do not exceed those of producers in the rest of the UK and Ireland.

Food labelling

Food labelling is an extremely important issue to UFU members as producers now operate in a competitive global market. Country of origin labelling is an element of particular concern to Northern Ireland producers. The dioxin crisis in the Republic of Ireland and the subsequent threat to the Northern Ireland industry highlighted the need for accurate labelling of pigmeat and pigmeat products.

We strongly believe that country of origin is a key piece of information about a product that must be available to consumers when they purchase food. It is also an area that is particularly at risk of misleading the consumer. The UFU believes mandatory country of origin labelling should be extended to all meat and dairy products, at least. Consumer interest in origin is particularly strong for animal products and a move to extend origin labelling to meat and dairy products should take priority. As regards pork, the Denny brand is a prime example where consumers wrongly perceive that the pigmeat used in these products originates from Northern Ireland. Origin labelling would correct this. The EU food country of origin labelling vote has recently been postponed until the new parliament is sitting. As it stands currently country of origin is only proposed on a voluntary basis. UFU continue to lobby retailers to promote local product as part of the 'Good Food is in Our Nature' Campaign.

Aujeszky's Disease (AD)

In 1992 a voluntary Aujeszky's Eradication Scheme was introduced. Legislation was introduced in 1994 to make the scheme compulsory for all pig herd owners. At that time it was estimated that it would take seven years to eradicate Aujeszky's Disease (AD) from Northern Ireland. Progress on eradication has been slow since 1994 but the industry is now in a position to submit an application for AD free status. UFU recognise the hard work done by DARD vets recently to ensure that the vast majority of pig herds in Northern Ireland have now been tested

for AD and are now confirmed free of the disease.

Despite good progress in tackling the disease on the ground, UFU are concerned that DARD progress in submitting the first application for official freedom (Annex II) has been extremely slow. It is vital that we make this first step towards finally achieving AD freedom without further delay.

UFU continue to lobby Government to progress the application for Annex II and Annex I. This will help open new export markets for Northern Ireland.

Animal by-products

The UFU continue to oppose the Government policy of transferring costs to industry. In the current economic climate, Government are taking every opportunity to reduce costs. Funding for the collection and disposal of fallen stock has now ended.

During a Plenary meeting of the European Parliament in Strasbourg in April MEPs voted in favour of the report on a proposal for the Animal By-Products Regulation. The report laid down improved health rules for animal by-products not intended for human consumption. The UFU and the other UK farming unions supported the report which included measures for the use of animal by-products in combustion processes, on-farm containment and disposal methods and recognition of the problems associated with disposal in remote areas.

The proposal will now go to the Agriculture Council to be rubber-stamped by EU farm ministers before summer and is expected to be in force by 2011. This move should reduce costs related to the disposal of fallen stock. Until these changes come into operation the UFU have successfully lobbied for the continuation of the National Fallen Stock Scheme in its present form.

Animal welfare during transport

The UFU have joined the other UK unions in opposing the proposed changes in animal welfare during transport regulations. The Commission propose to reduce maximum transport times from 24 hrs to nine hours. Although transport within Northern Ireland would not be affected, transport to mainland UK would effectively be prohibited. At the time of writing, pigs are being exported to GB for slaughter and it would be a backward step in terms of competition if this route to slaughter was closed.

For further information contact Colin Smith

PigRegen Ltd : Informing today, investing for tomorrow

PigRegen Ltd is a company funded by Northern Ireland (NI) pig producers in the form of a voluntary levy of 15 p per pig slaughtered. Pig producers are represented in the form of a Board of ten Directors, elected by contributing producers, from pig producers in various sectors determined by herd size. The directors act in a voluntary capacity and receive no remuneration. The funds collected are used in a variety of ways covering factors of importance to NI pig producers.

Some examples of these currently being supported are:
1. Research projects approved by the Board of Directors and mainly carried out in conjunction with the Agri-Food and Biosciences Institute (AFBI), Hillsborough. Reports on previously funded work can be accessed on the AFBI website at www.afbini.gov.uk. Current projects include:

- The effect of level of starter diet inclusion on the performance and gut health of post weaned pigs and
- Stage feeding the finishing pig to improve feed use efficiency, especially when pigs are taken to carcass weights of 95 kg.

2. Bi-annual Health Surveys carried out on pigs from participating herds slaughtered at NI slaughter plants. Each herd then receives results comparing their herd with other herds in the scheme and emphasising areas of concern which may require attention.

3. Education grants currently directed at supporting a PhD student researching into an approved project, again considered by the Board to be of importance to the NI pig producer in particular, and to pig production, in general.

The 3-year PhD studentship will focus on research to improve the productivity of the breeding sow herd in Northern Ireland and is being conducted through AFBI and Queens University, Belfast.

4. In conjunction with CAFRE pig technologists, a survey of management practices on NI pig units covering virtually every aspect of pig production including general management, nutrition, genetics, herd health and carcass information. This information will be used to make informed decisions on where research and information should focus to improve the profitability of NI herds.

5. Electronic distribution of information generated within projects supported by the company as well as other information which could be of importance to participating producers.

Every effort is made, and will continue to be made, to ensure that information generated is current and of importance to levy-paying producers in an effort to encourage their continued support and thereby help to improve their efficiency and competitiveness in an increasingly difficult market place.

For further information contact Howard Tonks

Ulster Pork and Bacon Forum

The Ulster Pork and Bacon Forum is a Pig Sector Forum representing levy payers in Northern Ireland. The organisation is made up of producers, breeders, processors, the feed industry and research advisory services.

The Forum is funded by an industry producer / processor levy and from sector-based projects in Northern Ireland. The Northern Ireland Regional Food Programme has enabled an enhanced marketing focus on Northern Ireland pork and pork products. The Forum also facilitates the Northern Ireland Salmonella Scheme (processor levy) and works closely with the British Pig Executive (BPEX) and Quality Meat Scotland (QMS) to promote and manage the Zoonoses National Control Plan (ZNCP) to reduce salmonella within supply-chains throughout the UK. The Forum Support Office is based at the Ulster Farmer's Union Headquarters in Belfast.

The Forum provides a link with retailers and the wider industry and provides marketing platforms for Northern Ireland pork, bacon and ham products. This has been achieved through the *Thank Goodness* ™ promotions and reinforced through NI Good Food is in Our Nature. NI pigmeat initiatives are a consensus between producers and processors with retailers and have led to several new pork lines, as well as bacons and hams. This has widened the product category and provided greater consumer choice.

The Forum Support Office is focused on enhancing the competitiveness, efficiency, profitability and demand for Northern Ireland pork and pork products. The Forum uses its professional Cookery Demonstration Services to increase consumer awareness in-store and this service is contracted out to the wider agri-food industry.

The Forum is dedicated to promoting the key functions of the supply chain and sector-based projects e.g. NI pork and pork products, producer initiatives, abattoir systems, processing and retail distribution activities.

Key strategic objectives:

- Increase the demand for Northern Ireland pork and pork products
- Introduce marketing platform(s) throughout retail distribution
- Rebuild industry confidence to invest in future
- Communication to and on behalf of all stakeholder groups
- Provide a professional Cookery Demonstration Services for all stakeholders
- Support the Northern Ireland butchery skills base
- Support research into the eating quality of pork i.e. assess pork quality
- Help the industry with herd/public health programmes

Frequency of meetings

The Forum meets at least six times per year and holds an AGM.

Sector Boards and Special Interest Groups

The Forum is represented on NI Food & Drink/Promotional Boards (FPNI & NIFDA) and UK organisations (BPEX) for the development of the pig industry.

Key marketing activities and the year ahead

An integrated campaign strategy to respond to market needs by increasing demand during key periods for NI pork sales. This will be set out in a 'Succulent Pork Strategy' publication for NI pork and pork products. This will support the pig industry/retailer push and focus on the consumer:

- Marketing Push: To increase the demand for NI pork
- Marketing Pull: To develop the key consumer messages
- In-line Communications: To attract consumers through integrated marketing activities

Meeting the challenge

The Ulster Pork and Bacon Forum support levy payers to meet the key objectives to grow and develop their sector for the profitability of all stakeholders.

For further information contact Keith Smyton

Food safety starts here!

The first step in a safe and secure food chain involves a responsible and well regulated animal feed sector.

The valuable work carried out by the Northern Ireland Grain Trade Association (NIGTA) in helping to develop the UFAS and FEMAS feed assurance schemes post BSE, and the compliance by their members of these schemes, is only borne out at times of crisis such as the recent dioxin scare. The methodology and HACCP-based principles of these schemes ensured that none of the NIGTA members' businesses were involved in the incident.

Furthermore it is only at times like this that one realises how important these feed assurance schemes, and others such as GTP for our trading members, are in protecting individual farm businesses as well as being an essential pillar in the effective operation of assured farm schemes, protecting processor businesses and ultimately NI plc's position in supplying end markets over the long term.

Another area of work which has been ongoing is the approval of GM plant varieties in the EU. NIGTA members are neither pro or anti GM, they supply GM, non GM, Omega 3 rich feed etc, according to customer requests, and are in favour of strict scientific evidence being available before approval. But the crux of this matter is that other countries can approve these varieties within six months while the unwieldy system within the EU takes over two years. This means that we import produce that has been fed on these varieties but cannot feed our own livestock with them. This differential in approval processes has the potential to be devastating particularly to the intensive livestock sectors within the EU.

A further aspect of these approvals is that the EU insists that there must be absolutely no trace of them found in any materials coming into the EU – in other words a zero tolerance policy. This

is an impossible criteria to maintain therefore shippers and their insurers are not going to take the risk of bringing materials to the EU.

Due to Northern Ireland's dependency on a high level of imports of its feed inputs NIGTA saw these problems much earlier than other associations and member states and hence has been at the forefront of the discussions for a change to the EU's Zero Tolerance policy and GM approvals. It is hoped that a technical solution on zero tolerance will be put in place over the next few months so that this threat to our intensive sectors is minimised.

NIGTA, the very first link in the food chain, was founded in 1966 and today represents traders, manufacturers, processors, distributors, brokers and service providers who are involved in both feedstuffs and fertiliser in the Northern Ireland agricultural supply trade.

NIGTA, as the leading voice for the agricultural supply industry, works to provide support and advice for member companies and ultimately their customers by effective lobbying, supplying information, encouraging and facilitating quality assurance schemes and liaising with other related organisations for the benefit of the agri-food industry.

The role of NIGTA in the local agricultural scene has developed considerably in recent years as we are increasingly consulted by both government and industry on a wide range of issues. In addition to responding to consultations and actively participating in industry discussions and decision making, the Association also provides expertise and support to the farming and food chain to assist Northern Ireland food production in remaining profitable and sustainable.

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