



PIG e:newsletter

Pig Information Group – Winter 2017 Report

Welcome to the winter edition of the PIG e:newsletter.

Autumn is a time of year for reflection as thoughts move from the year that has been to planning for the year ahead. Prices have remained high through 2017, prospects look good and many producers are investing in their businesses to make their enterprises more resilient to the challenges that lie ahead.

The uncertainty remains with BREXIT negotiations continuing, interest rates rising for the first time in 10 years recently and even the weather delivering an extremely challenging and in many cases, late harvest.

The sector's ability to adapt has also been vital over the past few months with the major slaughter house in Scotland closed down due to fire causing major logistical challenges for producers and supply groups. Despite the difficulties associated with moving pigs over longer distances, capacity and haulage was found to keep the flow of pigs moving and hopefully by the time of printing some semblance of normality will have returned with the slaughter line due to reopen in mid November.

Research is key to any industry's continued development and this edition contains updates on projects from two of the team of researchers at SRUC. These projects look at the effects of tooth shortening in pigs and also the importance of fibre in dry sow diets in terms of both quantity and type.

One reason why the pig sector has been able to continue increasing productivity and efficiency is that it has been quick to adopt methods to record and compare performance information. This can take various forms- financial, physical and in this edition we look at another option- a Carbon Audit which measures the efficiency of inputs against outputs.

This e-newsletter gives an insight into the work of the Pig Information Group, which comprises representative experts from SRUC's Research and Education groups and SAC Consultancy who work on various topics relating to pigs. Our primary aim is to enhance communication with those in the pig supply chain.

Contents

Markets- Prices ease through the autumn from their summer high 1

Research- Anna R Sinclair gives an insight into her research into the longer term effects of tooth clipping and grinding 2

Focus Topic – The importance of fibre in sow diets is discussed by Rick D'Eath, asking whether enough is currently being fed and looking at the different types available 3

Education- Anna Sinclair highlights the importance of pig farms in educating students about the pig sector 5

Management- Carbon Audits- how they can be used to assess the efficiency and deliver benefits to your business 6

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Prices ease slightly through autumn however remain high.

Month end date	EU Spec GB SPP (p/kg)	Change on month (£)	Average Pig Weight (Kg)	UK weekly clean kill-000head	LIFFE wheat futures-nearby contract (£/tonne)	Soyameal 46% Braz. (£/tonne) ex store L'pool
June	162.43	+5.21	82.18	197.0	142.68	278
July	164.54	+2.11	82.97	195.2	146.47	300
August	163.74	-0.80	84.02	206.1	139.44	296
September	160.44	-3.30	84.65	220.1	141.67	304
October	156.03	-4.41	84.66	214.3	138.96	301

Facts and figures calculated from industry sources (AHDB and Scottish Pig Producers)

- Pigmeat prices have remained strong through the summer although have eased as we enter autumn. It should be remembered that this is still a near 20 p/kg lift year on year and an increase of nearly 50 p/kg from 18 months ago.
- Slaughter weights have increased over the past few months, partly due to the usual seasonal increase however also due to disruptions at slaughter plants.
- The cereal harvest is finally over across the UK despite the challenging weather conditions for some. The wet weather has seen crop quality suffer with even reports of sprouting in the field in some areas. Despite this, prices have remained fairly static. Straw prices however have increased substantially year on year with the wet harvest also affecting quality with much baled in far from ideal conditions. What this means in terms of how the straw will last and what issues this will present (i.e. moulds and mycotoxins) remains to be seen.
- Soya prices have firmed on the back of reduced production figures in the USA, increased demand from China and delayed plantings in South America.
- The Bank of England took the decision to raise interest rates for the first time in 10 years from 0.25% to 0.5%
- While pigmeat prices have eased slightly in UK recently, prices in the EU have dropped more sharply as supply exceeds demand- a situation not helped by reduced exports to China
- Kantor Worldpanel have reported that while volumes of pork sold have decreased slightly on the year, retail prices have increased by 7%. This has seen overall spend increase by 6% year on year.



Using cutting edge research to discover the long lasting the effects of tooth shortening in pigs.

Tooth shortening (clipping or grinding the tips of the teeth) aims to reduce the risk of skin infections by reducing the ability of piglets to injure each other. Is it a genuine solution or are we just swapping one short-term, visible problem for another hidden, longer lasting one?

Pulp exposure is a common consequence of tooth shortening so while it helps reduce the risk of skin infections it also creates an entry point in the mouth where inflammation and chronic oral infections can take hold. The bacteria responsible are also capable of spreading from the mouth to surrounding tissues, joints, and even vital organs with the potential to cause diseases that are much harder to identify and treat than common skin infections.



Image 1. Pulp exposure following tooth shortening is likely to be painful and allows bacteria to enter.

Identifying piglets with oral inflammation and infections isn't feasible using basic behavioural observations. However, in response to injuries, cells produce signalling molecules called messenger RNA (mRNA). These molecules then trigger the production of proteins involved in healing and immunity. One such protein is interleukin 8 (IL8) which attracts protective white blood cells. IL8 mRNA is found in large quantities in human teeth affected by painful pulpitis.

In an initial 6 piglet study (see Table 1), 1 week after tooth shortening, greatly increased quantities (between 500-5000 times higher) of IL8 mRNA were present in the pulp of tooth-shortened piglets compared with their untreated siblings. At weaning (4 weeks), IL8 mRNA levels were still 30 times higher than normal in pulp taken from clipped teeth. This shows us that tooth

shortening can cause long-term inflammation – possibly due to chronic oral infections inhibiting the healing process – lasting up to at least a month after treatment.

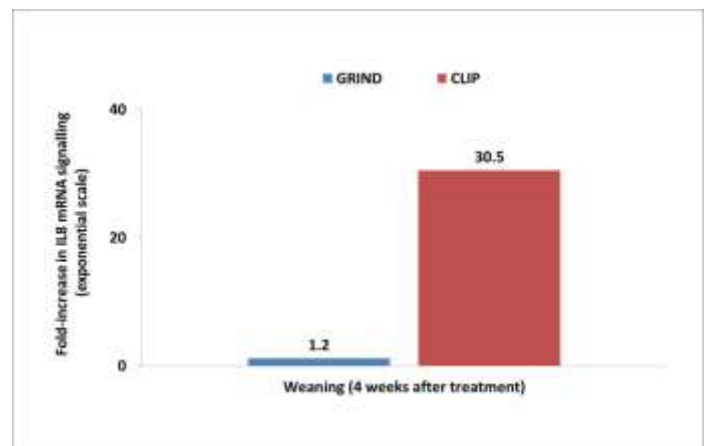
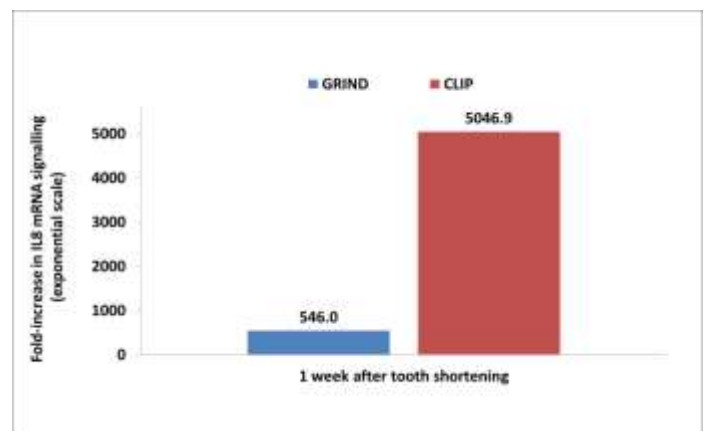


Table 1. Levels of mRNA in piglets 1 week and 4 weeks after tooth shortening.

A larger study comparing IL8 mRNA levels in clipped, ground and untreated teeth 1 week after treatment and 2 weeks after weaning is currently underway and will help determine whether healing continues and inflammation diminishes over time, or if the healing process and risk of infection are prolonged further by weaning stress and the introduction of solid food.

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FOCUS TOPIC



Fibre- An acknowledged requirement in sow diets but could increasing inclusion rates have greater benefits.

Adding dietary fibre to the diets of dry sows helps them feel fuller, is required by EU directives and UK pig codes- but are we feeding enough fibre and the right type?

A brief history of sow diets and housing

Sow nutrition has changed very little from the 1960s where advice was to feed generously during lactation and restrict during pregnancy for optimum productivity. Stall housing during pregnancy made feeding to the needs of individual sows possible without aggressive competition for feed. The confinement and abnormal oral behaviours seen (such as sucking, repetitive chewing at bars (**Image 1**) and over-drinking) led to concerns over sow welfare and bans of stall housing in 1999 (UK) and 2013 (EU).



Image 1. A dry sow chewing the bars of her feeding stall as she anticipates feeding time.

Hunger was recognised as a driver behind these abnormal behaviours with research in the '80s and '90s showing that offering sows more food reduced the incidence. The idea that 'high fibre' sow diets might reduce hunger led to an EU directive (2001) "**Member States shall ensure that all dry pregnant sows and gilts, in order to satisfy their hunger and given the need to chew are given a sufficient quantity of bulky or high-fibre food as well as high-energy food**". Feed companies responded to this by including fibre in sow diets and assuming that sows will be housed on straw-bedding and will 'fill up' by eating some of their bedding.

How much would a pregnant sow eat if not limited?

In a recent experiment on our research farm, we gave straw-bedded dry sows access to unlimited amounts of their standard dry sow feed (containing 16.4% bulk wheat-feed, resulting in 4.5% crude fibre) for just 3 days¹, to see how much they would eat if they were free to choose.

After an initial 'binge and recover', their intake pattern settled down and on the third day sows ate 5.2kg which was just over twice as much as their usual ration of 2.5kg with older sows, and sows later in pregnancy eating more.

Sows' behaviour changed markedly in response to free feeding with less abnormal behaviours such as rooting and chewing at bars or at bedding straw observed. Sows were less agitated before feeding, ate more slowly and were less active- standing and walking less and resting more (**Image 2**). The doubled feed intake and reduced behavioural signs of hunger in this study suggests that modern dry sows on typical commercial rations remain unsatisfied and are hungry.



Image 2. Sows which could eat as much as they wanted for 3 days in our experiment were much calmer and rested a lot more.

¹ NB: The free-feeding of typical commercial gestation diet was temporary to prevent any health issues that could arise from feeding sows a diet that is not designed to be ad lib.

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Dry sow diets – feeding fibre for fullness



What is dietary fibre?

EU rules promote 'high fibre' diets, but what is fibre? 'Dietary fibre' is defined as plant-derived materials that the sow can't digest with her own digestive enzymes. Within this broad class are lignin and non-digestible carbohydrates including cellulose, hemi-cellulose, fructans, pectins, non-digestible oligosaccharides and resistant starch. These include insoluble fibres - which provide 'bulk' and soak up water to soluble fibres - many of which can be fermented by bacteria in the sow's hindgut, releasing energy in the form of volatile fatty acids.

What are the benefits of fibre?

Fibre has a low energy density which means sows can have a greater weight and volume of food yet also restricts energy intake to avoid getting fat. Sows fed on higher fibre diets are calmer at feeding time, it takes them longer to eat and afterwards don't show as many abnormal oral behaviours. Certain fibres have also been shown to reduce the occurrence of gastric ulcers with high fibre gestation and pre-farrowing diets aiding both digestion and reducing the incidence of stillbirth during farrowing.

Does the type of fibre matter?

Although all fibre types have some benefits to sows, research suggests that the soluble, fermentable fibres (including resistant starch) have a greater effect on how full and satisfied the sow is than insoluble fibre. This is because bacterial fermentation in the hindgut releases energy some hours after a meal in the form of volatile fatty acids. This slow energy release is thought to delay the onset of hunger.

Insoluble fibres	Soluble and fermentable fibre
<ul style="list-style-type: none">• Wheat feed• Wheat straw• Barley straw	<ul style="list-style-type: none">• Sugar beet pulp• Soy hulls• Whole grains of maize• Potato (resistant starch)

Table 1. Examples of typical insoluble and soluble fibre sources in sow diets.

Some of the more common Insoluble fibres in sow diets and soluble and fermentable fibres found in feed ingredients are shown in Table 1. Although these sources are the most common, sows can and will eat a wide variety of feeds, including cereals, seeds, pulses and also high fibre ingredients including by-products,

root crops and even grass and silage.

How much fibre is "a sufficient quantity"?

Research into dry sow feeding has shown that sows can be given as much food as they want (*ad lib* feeding) if there is enough fibre in the diet. Inclusion rates of up to 40% of high-fibre ingredients are typical to achieve this 'saturation', but lower levels mean 'almost ad lib' ration feeding is possible.

Feeding or foraging?

A further EU directive came in to force in 2001 which required that pigs must have permanent access to a sufficient quantity of material to enable proper investigation and manipulation activities.

Even well-fed growing pigs have this need and foraging for food in restricted-fed dry sows increases this need further. Straw-bedded sows can use straw as an outlet although our recent study shows that abnormal oral behaviours continue to be performed even with access to straw. Indoor sows that have no access to straw are most at risk of abnormal oral behaviour and they need access to other forms of enrichment materials.

Unprocessed 'whole plant' fibre sources such as silage or turnips could be used to provide sows with additional nutrition including fibre and also provide enrichment.

What are some of the other issues with high fibre diets?

High fibre diets can be bulkier to transport with insoluble fibre tending to lead to an increase in the volume of faeces. Soluble fibre can lead to ammonia emissions from slurry being reduced and the nitrogen fertiliser value is increased. It should also be remembered that if there are limited feeders and spaces the increased feed volumes and feeding times may result in increased competition for access.

What can I do to improve conditions for my sows?

Ask your feeding company about the type and quantity of fibre in their diets. Consider providing additional fibre and foraging enrichment in the form of silage, hay, turnips etc. If you home-mix, consider the levels of fibre processed to be 'in diet', but also whether you could provide extra fibre in its raw form.

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PIG e:newsletter

Education



The vital role of pig farms in educating agricultural students about pig production.

As part of their courses SRUC students have been continuing to gain practical experience of pig farming by visiting local pig units.

At Oatridge HNC agriculture students are assigned a week to do duties with unit on campus so they experience the routine activities. National Certificate students also carry out farm duties for an afternoon or a morning per week (**Image 1**). In addition, lecturers provide supervision in tasks including injecting, weighing for sale, condition scoring of sows and selection of gilts plus anything else that needs doing – teething, tailing, ironing, moving and weaning. Research projects, including one on tail-biting, are currently being undertaken on the unit with the installation of 3D cameras in some of the pens aiding monitoring.



Image 1. Students getting practical experience of pig weighing at Oatridge

With no pig unit at SRUC Aberdeen, we rely on local farms to host students. All Aberdeen first year Agriculture students had an excellent and informative visit to Logiereive Farm, Udney by kind permission of Roderic Bruce using the information gathered to write a report on both the production aspects and marketing strategy at Logiereive.

Rural Business Management students at Aberdeen have visited the Monitor Farm at Mill of Carden by kind permission of Patrick Stephen. They were given a tour by manager Wayne Ducker with many students commenting how interesting they found the visit, especially how all the data collected on farm is used to constantly improve and develop the unit.

Carden pig unit is also providing facilities for an Aberdeen fourth year degree student to carry out her honours dissertation investigating the effect of water to feed ratio on the water consumption and performance of weaner pigs. The project has just started and she hopes to have her results completed by spring time.

Secondary school pupils in Aberdeenshire have taken the opportunity to visit local pig units through a Rural Skills module they can take in 4th to 6th year. Turriff Academy pupils visited Baluss Farm by kind permission of Sandy Howie. On the visit they spent most of their time in the farrowing houses learning a few of the basics about the pig production system.

The support of farmers, by welcoming pupils and students onto their units, is much appreciated. It must be remembered that these visits are often the first opportunity for students to experience the hands-on management of pigs and is highly valued by both staff and students.

These linkages between industry and education can only help encourage and inspire the next generation of stock people, managers, pig farmers and professionals.

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AgRE Calc[©] - A Carbon Audit tool to measure your efficiency and offer suggestions for improvement.

Carbon Audits have been used throughout industry for some time. Agriculture now has its own set of tools that calculate Greenhouse gas (GHG) emissions specifically catering for the sector. These include **AgRE Calc[©]** (**A**griculture **R**esource **E**fficiency **C**alculator), SAC Consulting's Carbon Audit Tool.

Greenhouse gases come from a number of sources on the farm as shown in Table 1.




Greenhouse gas (GHG)	Where from on the farm?	
Carbon dioxide CO₂	Burning fossil fuels. Use of oil, diesel and electricity on farm. Can make up around 10% of the farms emissions. Lifetime in atmosphere; 20 to 200 years.	
Methane CH₄	Natural bi-product of enteric fermentation. Can make up around 40% of emissions depending on farm type. Methane is 25 times more potent than CO ₂ . Approx. 12 yrs in atmosphere.	
Nitrous oxide N₂O	Soils naturally produce nitrous oxide but levels can be increased by cultivation and N fertiliser. Can make up around 50%+ emissions depending on farm activities. Nitrous oxide is 289 times more potent than CO ₂ . Approx. 115 yrs in atmosphere.	

Table 1. Greenhouse Gas sources.

Designed for farming businesses AgRE Calc measures GHG emissions associated with purchased inputs and on-farm activities and expresses them as outputs sold off the farm i.e. as an emissions intensity; this is also known as a Carbon footprint. The results are benchmarked against similar enterprises with potential areas for improvement highlighted, helping to improve efficiency.

Actions to reduce emissions intensity generally have a positive effect on the business in terms of increased efficiency and increased cost savings. This is therefore a win-win situation for the environment and the business.

Efficiency measures can be grouped into five key action areas and some examples of actions within each area are shown below:-

Using Energy and Fuel Efficiently

- Monitoring of electricity and fuel use.
- Switching off machines and lights when not in use.
- Planning work to minimise journeys

Developing Renewable Energy

- Opportunities to introduce renewable sources of heat and energy.

Locking Carbon into the soils and vegetation

- Planting trees to act as a carbon sink

Optimise the application of fertiliser and manures

- Use of fertiliser and nutrient management plans
- Analysis of soils and manures
- Target nutrient applications according to time, conditions and amount required
- Calibration of spreaders
- Consider precision farming technologies

Optimise livestock management

- Good livestock and crop husbandry practices e.g. improved growth rates, yields, etc
- Improved health of livestock and crops
- Improved grass growth and utilisation
- Reducing soil compaction and improved land drainage.



How can a pig farming business benefit from a Carbon Audit and what are some of the actions that can bring real results?

- As pig businesses have high requirements for energy, any move towards renewable sources will see positive results in terms of reduced emissions.
- Nutrient budgeting allows savings in terms of fertiliser with analysis of manures allowing applications to match crop requirements. As AgRE Calc[®] looks at the business on a whole farm basis any improvements in terms of fertiliser use or yield in cereal enterprises grown for home use will have positive impact on the emissions level of the livestock enterprise.
- Improving finishing weights, DLWG and FCR through looking at nutritional strategies will also see reductions in the carbon footprint of the business due to the increased output.

These actions will therefore improve the efficiency of the business and the resultant cost savings or increases in output should also see increases in profitability.

An example of a report produced by AgRE Calc[®] for a pig finishing enterprise is shown below, benchmarked against a similar enterprise. While the enterprise finishes its stock slightly lighter and mortality was higher than the average- purchased feed use was lower and

overall emissions significantly below the comparison data set. This example was shown to have a low carbon footprint and very efficient relative to similar enterprises- although reducing mortality would offer scope for further improvements.

Through programmes such as the Monitor Farms and Climate Change Focus Farms, AgRE Calc[®] has been used to identify areas for change with host farmers using the results to identify and implement changes to management practices. **One arable and beef farm saved £19000, reducing the carbon footprint of the business by 19%.**

Key actions implemented by the business include

- Manure analysis and use of GPS
- Improved fuel management
- Increased crop yields
- Increasing clover content in grass leys.

AgRE Calc[®] is available for farm businesses to complete their own Carbon Audits free of charge. Carbon Audits are also now supported through the Farm Advisory Service with £500 available to allow an accredited advisor to complete one for your business. Further information about funding can be found at: <https://www.fas.scot/carbon-audits/>

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Enterprise type: Indoor finishing
System: not specified
Group:
Producer:
Farm: Pig farm

Year calc relates: End May 2016
Reporting date: 24th Oct 2017
Report reference: Indoor finishing Compared to: IF

Quick glance enterprise emissions				Physical performance of enterprise		
	* kg CO ₂ e/ kg dwt	Opportunity Level	Comparison		Value	Comparison
Enteric fermentation	0.09	Low	0.22	Area of land utilised (ha)	-	-
Manure management	0.90	Low	1.18	Female breeding stock (no)	-	-
Fertiliser	-	Low	-	Weaner sale weight (kg lwt/head)	-	-
Purchased feed	1.28	Low	1.45	Grower sale weight (kg lwt/head)	-	21.38
Purchased bedding	-	Low	0.04	Finisher sale weight (kg lwt/head)	100.00	104.95
Fuel	0.01	Low	0.02	Growers % of sales	-	1
Electricity	0.01	Low	0.02	Finishers % of sales	100	99
Other	0.01	Medium	0.00	Purchased feed use (kg/head)	113	236
Total emissions **	2.29	Low	2.94	Mortality (%)	18	14
<i>Other: crop residues, lime, transport and waste</i>				Sow cull rate (%)	-	-

Table 2. Example of enterprise emissions report benchmarked against similar enterprise.

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The PIG e:newsletter was produced by the Pig Strategy Group at SRUC through funding from the Universities Innovation Fund, from Scottish Funding Council. Should you wish to know more about any of the articles featured or wish to find out more about SRUC pig related activities please contact the following or click on the links below.

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