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# Tail docking - are the effects longer lasting than a short sharp shock?

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Print publication: 01/07/2017

*Document Version*
Publisher's PDF, also known as Version of record

Link to publication

*Citation for pulished version (APA):*
Sandercock, DA. (2017). *Tail docking - are the effects longer lasting than a short sharp shock?* (PIGe:newsletter). Scotland's Rural College (SRUC).

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# PIG e:newsletter

SRUC

## Pig Information Group – July 2017 Report

## Welcome to the July edition of the PIG e:newsletter.

**Once again the PIG e:newletter has followed an election and while the latest poll may not have the same potential ramifications as others in the previous twelve months, it will still add to the uncertainty coming up to a crucial period as the United Kingdom negotiates its exit from the European Union.**

**This period of uncertainty has seen the pound weaken considerably and this has lifted the price of pig meat to levels where good returns can be made. This has given the industry an opportunity to look towards investment and future proofing of their businesses.**

**With this in mind this issue looks at the potential for installing heat pumps utilising slurry. Not only could this help reduce energy bill however it offers the potential to bring in another income source through RHI.**

**Research is key to any industries future and the pig sector is no different. SRUC are involved in numerous pig-related projects and Dale Sandercock has written about an EU funded project he has been involved with looking at the long term effects of tail docking.**

**Whilst profitability may have improved in the last twelve months there is still scope for health improvements to help ensure future profitability. PRRS can have devastating effects on pig herds. Jill Thomson writes this edition's Focus Topic looking at what PRRS is, discussing the different approaches that can be taken depending on a farms PRRS status and also looking at the steps other countries have taken.**

**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



**Need an expert?**

**Contact us using the links on page 8.**


Universities Innovation Fund, from Scottish Funding Council

# PIG e:newsletter
## Markets

# Prices carry on climbing as currency and supplies continue to impact on market

| Month end date | EU Spec GB SPP (p/kg) | Change on month (£) | Average Pig Weight (Kg) | UK weekly clean kill-000head | LIFFE wheat futures (£/tonne) | Soyameal 46% Braz. (£/tonne) ex store L'pool |
|---|---|---|---|---|---|---|
| February | 149.75 | -0.91 | 83.27 | 192.2 | 146.4 | 329 |
| March | 151.53 | +1.78 | 83.08 | 190.6 | 146.68 | 309 |
| April | 156.11 | +4.58 | 82.78 | 197.9 | 147.83 | 298 |
| May | 157.22 | +1.11 | 82.81 | 192.5 | 145.36 | 291 |
| June | 162.43 | +5.21 | 82.18 | 197.0 | 142.68 | 278 |

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

- The EU Spec GB SPP has continued its upward trend since the BREXIT referendum over a year ago due to the pound weakening relative to the euro over the period combined with tightening supplies. Prices breached 160p/kg in June with current prices nearly 40p/kg higher than 12 months earlier and at time of printing reaching 163.86p/kg

- While currency has helped the pig price it has also lifted cereal prices with November 2017 wheat futures now above £150/ton with global weather concerns also supporting recent price rises over the last 10 days. Harvest has (just) begun in the UK with qualities and yields looking promising. Locally crops look clean and suggest good potential. Straw prices for the coming year have almost doubled in some areas due to increased competition from other market outlets (e.g. renewables).

- Weaner prices are also significantly higher year on year with 7kg weaners at £43.98 and 30kg weaners now £61.12. This represents a rise of £12.92 and £18.30 on the year (AHDB).

- Retail demand continues to fall however tight supply and improved export demand has helped producers share of the retail pork price increase to 43.2%- the highest since December 2013 (AHDB). Kantor Worldpanel data indicates that volume purchases have dropped by 3%.

- Exports of pig meat from the EU fell year on year during the first part of 2017 (Eurostat) particularly to China. This was due to increased competition from North America and Brazil combined with tighter home production and increased prices.

PIG e:newsletter
Research

# Tail docking- are the effects longer lasting than a short sharp shock?

The EU funded project **'FareWellDock'** aims to end tail docking of pigs through decreasing tail biting risk by environmental enrichment and developing better early warning tools of impending problems.

Tail docking, a painful procedure carried out soon after birth considered necessary to reduce the risk of tail biting- can result in chronic pain and infection at the wound site **causing up to 30% production losses in severe outbreaks.** Key objectives of the FareWellDock project were to estimate the relative harms associated with tail docking and tail biting.

***Image 1**. hot-iron tail docking* ***Image 2.** cauterized tail stump*

**What are the physical effects of tail docking?**

Tail docking is painful at the time of application and for a short time afterwards (typically 1-7 days) however there was increasing concern that it may also cause long-term pain. Tail docking leads to the development of traumatic neuromas in the tail stump by the severing of caudal nerves in the tail. Traumatic neuromas are disorganised bundles of nerves that develop when axons are severed and can cause increased sensitivity to pain at the site of injury due to spontaneous and abnormal nerve firing patterns.

**Traumatic neuroma development and implications for long-term pain in pigs**

SRUC and Newcastle University researchers have established that-

- Tail docking causes significant tail injury with traumatic neuroma development a consistent feature of this type of injury
- Although superficial healing of the tail stump is evident 1-2 weeks after docking active deep-tissue remodelling and repair (wound healing) and neuroma proliferation are on-going **4 months after tail docking**[1]
- Elevated tail sensitivity is present 4 months after tail amputation[2]

***Image 3.** Cross-section of 3 day-old piglet tail showing location of 4 caudal nerve trunks*


***Image 4.** Diagram of a traumatic neuroma*

These findings show that tail amputation causes sustained changes in sensory nerve function in the tail stump leading to increased sensitivity to pain suggesting that pigs can experience prolonged pain as a consequence of this type of tail injury.

**References**

[1]Sandercock DA, Smith SH, Di Giminiani P, Edwards SA (2016) Histopathological characterization of tail injury and traumatic neuroma development after tail docking. Journal of Comparative Pathology 155, 49-49.
[2]Di Giminiani P, Edwards SA, Malcolm EM, Leach MC, Herskin MS, Sandercock DA. (2017) Characterization of short- and long-term mechanical sensitisation following surgical tail amputation in pigs. Nature Scientific Reports 7, 4827-4836.

Information on the project activities and research publications can be found on the FareWellDock website (http://farewelldock.eu/) with a set of practical recommendations on tail docking and tail biting and four fact sheets can also be found at (http://farewelldock.eu/info/factsheets/)

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PIG e:newsletter
FOCUS TOPIC

# The latest on PRRS- a vets view and could a collaborative approach be the way forward?

## What is PRRS?

**PRRS stands for porcine reproductive and respiratory syndrome**, which is exactly what this virus causes – reproductive problems in sows and gilts, and respiratory disease especially in growing pigs.

There are two main types of the virus –

- **genotype 1**, also known as the EU strain and endemic in the UK, introduced accidently into our naive population in the 1980's
- **genotype 2,** also know as the US strain, prevalent in North America but fortunately we do not have this strain in the UK. Genotype 2 is much more virulent than genotype 1, causing a severe illness and deaths in sows, as well as young and growing pigs.

## How can it enter a herd?

'High health' or 'Minimum Disease' herds are free from PRRS virus and this is very beneficial for the health of all ages of pigs. The PRRS-free health status of herds is maintained through strict biosecurity and getting replacement stock and semen from PRRS-free sources. Quality Meat Scotland provides a Health Declaration form that should be used by suppliers of breeding stock and semen to confirm the health status of the source farm. Producers who are buying-in replacement stock and semen should ask suppliers for the completed Health Declaration form, and check the information with their vet to ensure that the health status is compatible with that of their own herd.

The virus can be introduced to a herd in many ways; the biggest risks being live pigs that are carrying the virus or semen from an infected boar. The virus can spread locally via air-borne infection from an infected herd, or risks like pig haulage, particularly parked trucks with pigs on-board. Accidental spread can occur via lorries, boots, equipment, clothing etc if there are lapses in biosecurity as regards strict infection control.

## How does PRRS virus affect pigs?

In a herd situation, pigs mainly get infected via the respiratory tract. The virus enters the blood stream within a couple of days causing viraemia, high temperature and general lethargy. Viral-type pneumonia develops causing pigs to have respiratory difficulties similar to influenza. In pregnant animals, it can cause deaths of foetuses, abortions and premature farrowings. Sows that farrow at the normal time have weak piglets that are poorly, often have splay legs and have little desire to suckle. Many fade and die. Gilts and sows that have been served recently have poor pregnancy rates, with many returning to oestrus at 21 days or at irregular intervals. Boars generally do not show any clinical signs but they shed virus in semen and this can continue for a number of weeks making them a long-running source of infection in a herd.

## PRRS virus knocks out the bodyguards!

At the microscopic level, PRRS virus hits the normal production of macrophages (a type of white blood cell) which has serious consequences for the pig. Macrophages are like travelling bodyguards that hurry to trouble-spots when needed, engulf bacteria or other infections and destroy them, reducing the chances of such infections causing disease. Pigs with PRRS infection are much more susceptible to bacterial diseases, even pigs with sub-clinical infection where signs of PRRS are not apparent. Conditions such as 'greasy pig' disease, Glasser's disease and joint infections can be really problematic in PRRS-positive herds in addition to serious and persistent pneumonia problems.

## What tests are available for PRRS virus?

**Getting saliva samples – pigs willingly chew the strands of cotton rope allowing collection of a 'group sample' for PRRS virus testing.**

PIG e:newsletter

# PRRS- how to identify it and options for control.

Your vet can test for PRRS virus in pigs by taking blood samples, saliva samples or throat swabs. The lab can detect if PRRS is present and if so, confirm the genotype. Blood samples can also be used for serology, confirming whether or not a pig has got antibodies to the virus from a previous infection. Herds that regularly monitor for freedom from PRRS virus (such as boar studs and multiplication herds) usually do both types of tests to provide the best available information.

## What else can we find out?

When samples test positive we can send the viral RNA extracts to the Animal and Plant Health Agency (APHA) where colleagues carry out surveillance for changing strain types of PRRS virus. They sequence the virus from the samples and test it against all the information that they have on strain types. That shows how closely related a strain is to the vaccine strains, for example, or strains from other units. This can be helpful when trying to trace potential sources of infection in new disease break-downs. The sequencing information is presented on a type of genetic 'tree', as shown in the diagram below. Each of the branches represents different "families" of the virus.

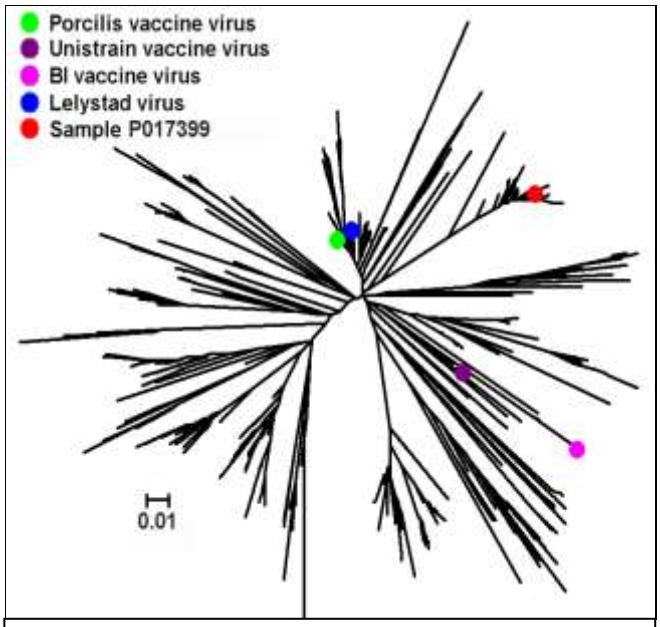


Diagram showing the relatedness of a PRRS virus strain from a recent blood sample (Red dot - P017399) compared with the available UK vaccine strains. Genetically, the strain is quite different from any of the vaccine strains, however, the vaccines are generally effective because the antigen components in vaccines generate the immune response..
PRRSv genetic tree of UK strain types, with kind permission - APHA, Weybridge)

## What can we do to control PRRS?

In infected herds, it is important to have a regular vaccination programme to maintain a stable immunity in the herd. This involves vaccinating all adult stock and weaners. The strategy is combined with using good herd management including all-in, all-out systems for growing pigs so age-groups are not mixed and any poor-doing pigs not held back and mixed with younger animals.

PRRS virus can be eradicated from herds successfully. It is worth farmers working together to consider a regional approach to eradication, thereby reducing the risks of re-infection from nearby herds. National eradication has been carried out successfully in some countries e.g. Switzerland.

A similar program could bring huge health and financial benefits to the Scottish industry, and something that pig farmers and the industry as a whole should carefully consider.

**What a triumph it would be if we were able to say 'PRRS is history'!**

**Jill Thomson**

# From factsheets to stress pigs and giant inflatables- SRUC gets its message across at the RHS.


Naomi Scott engages with interested attendees at the RHS, assisted by Pea-ter and the stress pigs!

Another Royal Highland Show done and dusted and another record breaking year with 190,000 visitors reported to have attended. This year the Pig Information Group had a dedicated stand alongside SAC Consulting in the SRUC stand.

On offer over the four days of the show were pocket sized information cards, providing research and advice for reducing mortality (both stillbirths and pre-weaning), reducing aggression, the risks of mycotoxins and alternative protein sources.

We were joined by Pea-ter the inflatable Green Pig, as well as a display of soya beans, soya bean meal, peas and beans to illustrate where the soya bean meal used for pigs comes from and what home grown alternatives we have.

Very popular on the stand were our Stress Pigs – only one little piggy made it home! Our anatomical pig was also well received, testing the anatomy knowledge of our visitors, with many commenting on the surprising size of the pig's pancreas.

Over the weekend we met with a range of commercial producers, industry contacts, and smallholders, as well as budding young agriculturalists. Discussions were diverse, from the basics of what we do as a group to practical advice, and we were pleased with the number of visitors stopping by for a chat.

If you didn't make it to the stand at RHS, but would like a set of our information cards, please email Emma Baxter, emma.baxter@sruc.ac.uk, with your postal address.

Similarly, if any of your colleagues or friends would be interested in receiving the P.I.G. Newsletter in future, please ask them to email george.chalmers@sac.co.uk, requesting to be added to the mailing list.

**Naomi Scott/ Jos Houdijk**

PIG e:newsletter
Management

# Heating buildings using slurry? A great opportunity or just hot air.

**There is a chance you may have heard of ground or air sourced heat pumps, but not many have heard of *Slurry Sourced Heat Pumps*. However could this be the future of heating in pig units?**

Heat pumps are often described as fridges in reverse. In fact they are just fridges running in exactly the same way, the equipment on a fridge takes heat from the inside of the fridge and *moves* it to the outside of the fridge. In a heat pump it takes heat from a source and moves it to where you want it, a room, a hot water cylinder, a heat pad perhaps.

Most heat pumps are compressor based heat pumps, for the working principles of compressor heat pumps see Figure 1.

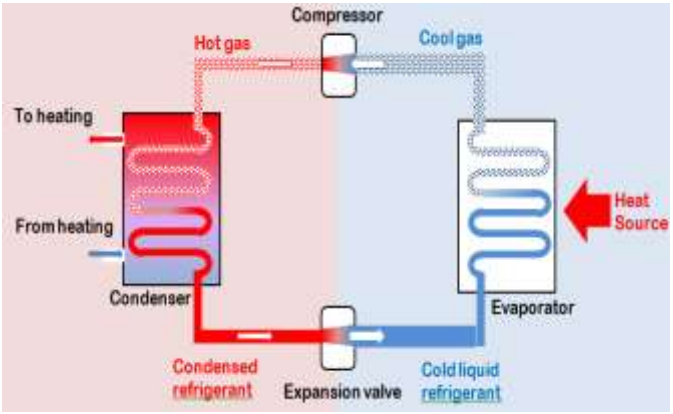


**Figure 1: Principles of a compressor based heat pump**

So for a heat pump to work all we need is a source of heat above about -15°C, **yes *minus* 15°C**, and electricity to run the compressor. The amount of compression that needs to be done depends on the temperature of the heat source, the cooler the source the more compression it needs and therefore more electricity. Therefore at -15°C you will only get out slightly more heat than electricity you put in, but once the temperature of the heat source is up towards +10°C most heat pumps should easily deliver 3-4 times as much heat as electricity put in. This ratio of electricity in to heat out is known as the ***Coefficient of Performance*** **(COP),** in effect efficiency.

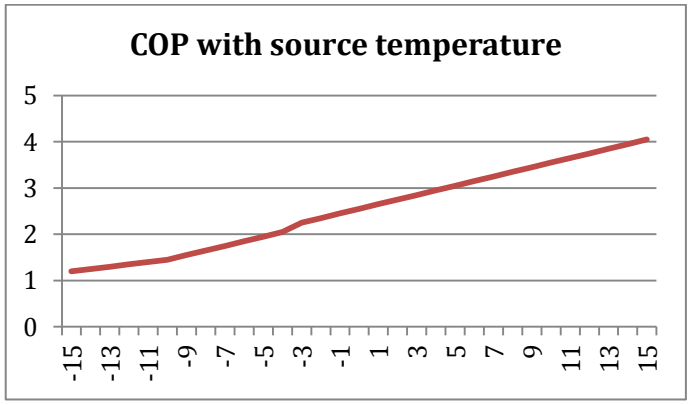


**Figure 2: Change in efficiency with heat source temperature**

As we can see the temperature of the heat source plays a big part in the efficiency of the system.

Air source heat pumps use the air, with typical COP (efficiency) over the year in standard space heating situations about 2.5 i.e. 2.5 units of heat for every unit of electricity.

Ground source heat pumps use the ground between 1.5 and 2m deep, with a relatively constant temperature and in the winter warmer that the air. This is why the COP over a year in standard space heating situations should be around 3.5. **Pig units however are not "standard" heating situations,** the heat load in

the summer doesn't drop away to nothing and creep heating still has to be run**.**

In the summer air is warmer than the ground and hence air source will be more efficient, which could well bring efficiencies of ground and air source closer together in pig units, air source is usually cheaper to install so you would think air source would be the way to go. In the UK however we have the Renewable Heat Incentive (RHI) which pays for renewable heat we produce. Due to lower installation costs and lower efficiencies in most situations, air source is paid less than a third of ground source, which make ground source the most obvious choice for most.

On farms, ground source heat pumps normally use horizontal ground loops (pipes) buried 1.5-2m below the surface. Water flowing through the loop absorbs heat from the ground which is then used in the evaporator of the heat pump. The "ground" loop can be placed in a river or lake, then referred to as a water sourced heat pump. **Even in the summer the ground or water is only at 10-12$^{o}$C, so imagine how much heat could be gained from pig slurry at 30-37$^{o}$C? This is not pie in the sky, it has already been applied on the continent with some Scandinavian pig units already using this and achieving COP of 5-6.**

The simplest approach is to put the ground loop into the slurry tank, the potential heat output depends on the size and shape of the tank and the temperature of the slurry when it reaches the tank. If you're building a new shed, another approach is to put the ground loop pipes cast into the concrete under the slurry channels, this gets the slurry at the highest temperatures.

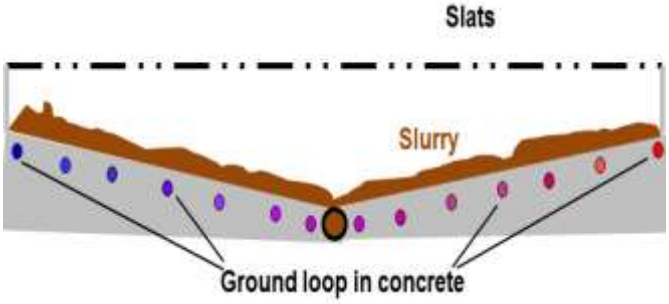


**Figure 3: Ground loop installed in slurry channels**

Simple energy balance calculations suggest that the slurry alone may not provide enough heat. Approximately 20m$^{3}$ of slurry at 35-37$^{o}$C is produced per sow per year, assuming we can only cool it to 7$^{o}$C (otherwise we may as well use the ground) that will produce about 700kWh of heat. Energy bills from pig producers suggest the heating requirement per sow is between **600kWh and 1,000kWh.** Therefore it may be necessary to install a conventional ground loop in the actual ground in addition.

**It should be noted that with respect to the Renewable Heat Incentive, this system of using the slurry as the heat source may fall outside of their standard definition for ground or water source of; "*naturally occurring energy stored in the form of heat in the ground, including water in the ground, or surface water*". However subsequent changes to the regulations allowed for: "*heat from processes other than heat generation*" which could cover this process, but it is important it is checked with Ofgem before a project proceeds.**

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# PIG e:newsletter

**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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