Proceedings of the 16th London Swine Conference: "A Platform for Success"
London, Ontario, April 5-6, 2016, 135-143

HOW DO I GET IT RIGHT? POST WEANING DISEASE CONTROL – A UK PERSPECTIVE

David Burch[1] and Terri O'Sullivan[2]
[1]Octagon Services Ltd; [2]University of Guelph
d.burch@octagon-services.co.uk; tosulliv@uoguelph.ca

ABSTRACT

Climatically, Canada is such a different country to the UK when it comes to pig production, and N. America has a number of endemic disease problems that fortunately we have not got yet. Overall though, swine infections are similar in many ways and occur in patterns of infection during the production period. Younger animals, especially weaners and growers, are more susceptible to a number of husbandry and environmental factors as well as stresses, which can trigger disease outbreaks. *Escherichia coli* is probably the most common problem associated with post-weaning diarrhoea but there are several other infections that can be brought on depending on what infections are present on the farm, the immunity in the herd whether natural or vaccine stimulated and also what medication programmes are used or not.

The different common patterns of disease in pigs are examined and the best ways of control will be discussed in the workshop.

INTRODUCTION

Canada is such a different country climatically to the UK (even to Scotland) and the long, cold winters must bring on some difficult challenges to pig production – keeping animals warm in the winter, temperature fluctuations and ventilation issues. The former is a challenge to newly weaned pigs in particular and the latter, or lack of it brings on problems with respiratory and systemic infections. The infection mix can also make a huge difference to productivity and the pig's performance, and how you handle the mixture of infectious challenges at various stages is also vital to optimise production. Your disease organisms are different, e.g. porcine epidemic diarrhoea virus (PEDV), porcine reproductive and respiratory disease syndrome virus (PRRSV) seem to be more pathogenic than the ones we have in Europe, so your understanding of controlling these are probably well embedded already and different from ours.

I will try to review some of the factors that have helped production in the UK and they may or may not be applicable to Canadian production for a variety of reasons, but some might help.

UK PRODUCTION OVERVIEW

The UK has about 400,000 breeding sows and produces approximately 10 million finishing pigs a year. The median herd size is 500-749 sows (29%). The UK sow produces 23.7 pigs/year and 1,917kg of meat/sow (BPEX 2015). We are one of the smaller EU producers and import nearly 50% of pork products as fresh meat or processed meat. One of the major differences is that 40% of our sows are reared and bred outdoors. This is unusual in Europe let alone Canada. We don't castrate boars either, so this reduces handling, stress and open wounds at processing (< 7days of age). Outdoor piglets are not routinely given iron either, which all minimises handling. Tail docking still is relatively common and piglets weaned/litter are usually 1-2 pigs lower (Table 1) but the concept of **'outdoor bred'** has been successfully marketed to the consumer as **'welfare friendly'**.

Table 1. Comparison of indoor and outdoor production performance (BPEX, 2015).

Parameter	Outdoor	Indoor
Pigs born alive/litter	11.36	12.63
Pre-weaning mortality (%)	14.18	11.53
Pigs weaned/litter	9.75	11.16 (+1.41)
Pigs weaned/sow/year	21.82	25.71 (+3.89)
Ave weight of weaned pig (kg)	7.02	7.13
Ave age of weaned pig (days)	26.08	26.56

Once they have been weaned at approximately 4 weeks of age they come indoors. For me, weaning at 4 weeks rather than 3 weeks has made a substantial difference to post-weaning problems. It is meant to be obligate in the EU but is frequently ignored. There was a combination of events that brought this on in the UK. It was primarily introduced at the time of post-weaning multisystemic wasting syndrome (PMWS) caused by porcine circovirus type 2 (PCV2) to try to reduce the stress of weaning before the vaccines were introduced (Figure 1). However, before this time we had banned gestation stalls in 1999 and the industry was contracting rapidly (-40%). Many farmers had to change their sow management systems and many went outside to reduce capital costs, they also switched to more 3-site production to try to overcome PRRSV, utilising straw yard systems. We also had foot and mouth disease and swine fever outbreaks, which restricted our movement of pigs and damaged our export of breeding stock (PIC, JSR and NPD/ACMC).

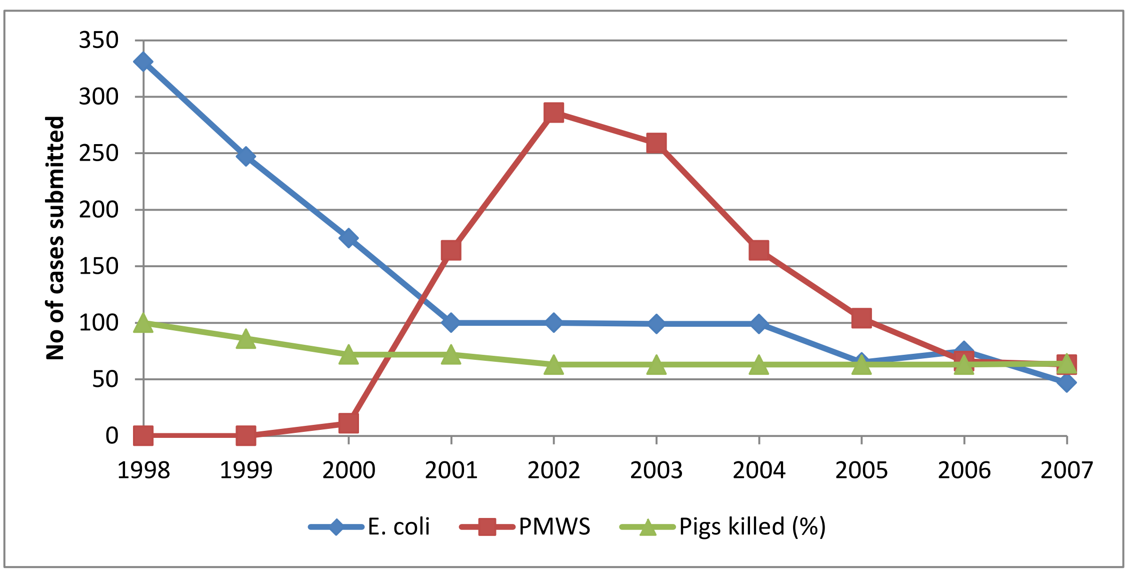

Figure 1. Disease reporting – *E. coli*, PMWS and number of pigs killed (VLA/BPEX).

So many changes occurred at around the same time which depressed the industry and major cost savings were required. This all led to 4 week weaning, the wider use of straw yards and the widespread use of therapeutic levels of zinc oxide (3500ppm) in the feed in creep and link diets around weaning to stop post-weaning diarrhoeas, primarily due to *Escherichia coli*. This also reduced the duration of the post-weaning check from 2 weeks to a single week, before the pigs grow on again vigorously. Table 2 provides comparative performance data.

Table 2. Weaner/grower performance in the UK 2014 (BPEX, 2015).

	EU average 2013	UK average	Top third	Top 10%
Ave weight of pigs at start (kg)	7.4	7.5	7.3	7.6
Ave weight of pigs produced (kg)	29.9	37.1	32.4	21.3
ADG (g)	417	502	481	394
Days in herd	-	58	51	34
FCE	1.85	1.71	1.46	1.17
Mortality (%)	2.6	2.8	2.5	2.5

As we were not castrating piglets, the use of long acting cephalosporins such as ceftiofur was not widespread, unlike in the EU and I understand N. America. I suspect that this is the main reason that methicillin-resistant *Staphylococcus aureus* (MRSA) had not been selected for and why it has rarely been reported in England and Wales to date (2 cases). Also, our National Pig Association insisted that any breeding stock being imported into England and Wales were shown to be free of MRSA and US PRRSV. In Northern Ireland this was not the case and now several cases of MRSA in pig herds have been reported, thought to be associated with the importation of Danish breeding stock. Being an island can be helpful regarding international biosecurity.

ENTERIC DISEASES

Common enteric bacterial diseases that are found before weaning and in the weaned/nursery period are summarized in Table 3; infection patterns are illustrated in Figure 2.

Escherichia coli

Infection post weaning is associated with ETEC *E. coli* and affects almost all pigs by giving them a growth check, which we attempt to minimise by reducing stresses and use of zinc oxide as discussed previously. If not controlled properly then this can lead to diarrhoea and even death. It classically comes on 5 days after weaning and used to last for 2 weeks before they grew on again. This is reduced to one week if weaning occurs at 4 weeks of age. After this period, occasional scours were seen after moving at 8 or 12 weeks and bowel oedema can occur a few weeks after weaning mainly associated with VTEC *E. coli*. This can cause sudden death in rapidly growing weaner pigs.

Salmonella spp.

Infections are often not clinical in pigs, but infections normally occur in the growing pig, usually with whatever is present in the weaner/nursery accommodation. The salmonella strains are often different from the sow and piglet with *S. enterica* Typhimurium being the most common in pigs. Clinical disease can develop at almost any time, and may lead to septicaemias, but recently it has been reported more frequently post treatment with amoxicillin for meningitis in weaners, as it is thought to disturb the gut flora allowing for salmonella overgrowth.

Table 3. Common enteric bacterial diseases in the pre-weaned and weaned pig.

Bacterial species	Disease	Age
Escherichia coli	Neonatal scours Piglet scours Post-weaning diarrhoea	1-3 days 7-14 days 5-14 days after weaning
Clostridium perfringens	Type C – necrotic enteritis Type A – diarrhoea	1-7 days 10-21 days, weaned pigs
Clostridium difficile	Diarrhoea, ill thrift	3-7 days
Salmonella spp.	Typhimurium – occasional diarrhoea, septicaemia, death Derby – occasional diarrhoea Choleraesuis – septicaemia diarrhoea, death	Grower pigs 6-16 weeks Grower pigs 6-16 weeks Finishing pigs 12-16 weeks
Lawsonia intracellularis	Porcine proliferative enteropathy (ileitis) Regional/necrotic ileitis Porcine haemorrhagic enteropathy	Grower pigs Grower pigs Finishing pigs and young adults 16-40 weeks
Brachyspira hyodysenteriae	Swine dysentery	Growers and finishers, 6-26 weeks All ages in primary breakdown
Brachyspira pilosicoli	Intestinal spirochaetosis 'colitis'	Grower pigs

Brachyspira spp.

The incubation period for spirochaetes such as *Brachyspira* spp is 7-21 days so they are more frequently encountered later on in the grower/nursery stage and then they can become affected at any time right through to the fattening period. *Brachyspira hyodysenteriae* is the most severe, but in Canada reports of *B. hampsonii* are also severe involving haemorrhagic diarrhoea and much mucous scour. This can lead to weight loss and even death if not promptly treated. *Brachyspira pilosicoli* is generally milder causing mucoid diarrhoea and slower growth rates and poorer feed conversion efficiency (FCE) but deaths are rare.

Lawsonia intracellularis (ileitis)

Lawsonia, the cause of ileitis, is very commonly found in many farms (>90% in the UK) but does not necessarily cause major disease problems. It is similar in severity to *B. pilosicoli* in many ways, causing a soft diarrhoea and poor performance, but mortality is usually low. In the older pig a sudden peracute infection can cause porcine haemorrhagic enteropathy or 'bloody gut', where finishing pigs are found dead with very pale carcasses. It is not usual in grower pigs. Mixed infections can occur so a comprehensive diagnosis using PCR and culture of faecal samples is important.

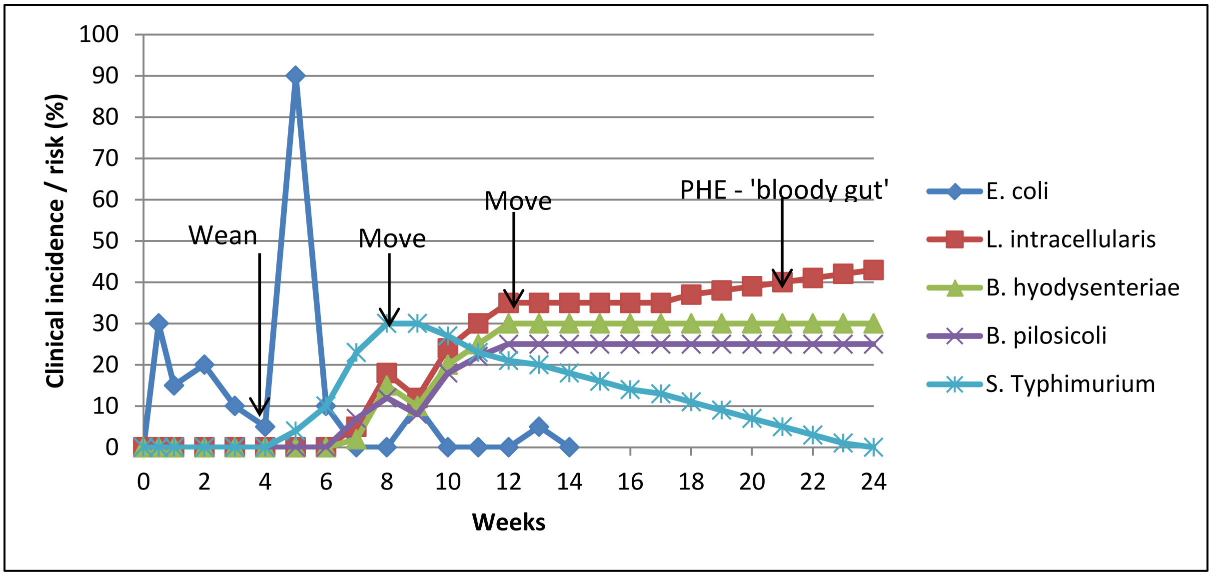

Figure 2. Overview of common enteric agent infection patterns (after Burch et al, 2008).

RESPIRATORY DISEASES

Common bacterial respiratory diseases are summarised in Table 4 and Figure 3.

Table 4. Common respiratory bacterial diseases in the pre-weaned and weaned pig.

Bacterial species	Disease	Age
Pasteurella multocida (D) *Bordetella bronchiseptica*	Atrophic rhinitis	1-8 weeks Nasal distortion lasts for life
Mycoplasma hyopneumoniae	Enzootic pneumonia	Grower and finisher pig
Pasteurella multocida	Mycoplasma-induced respiratory disease (MIRD)	Grower and finisher – secondary invader
Actinobacillus pleuropneumoniae	Pleuropneumonia	Grower and finisher – MDA last for 10 weeks

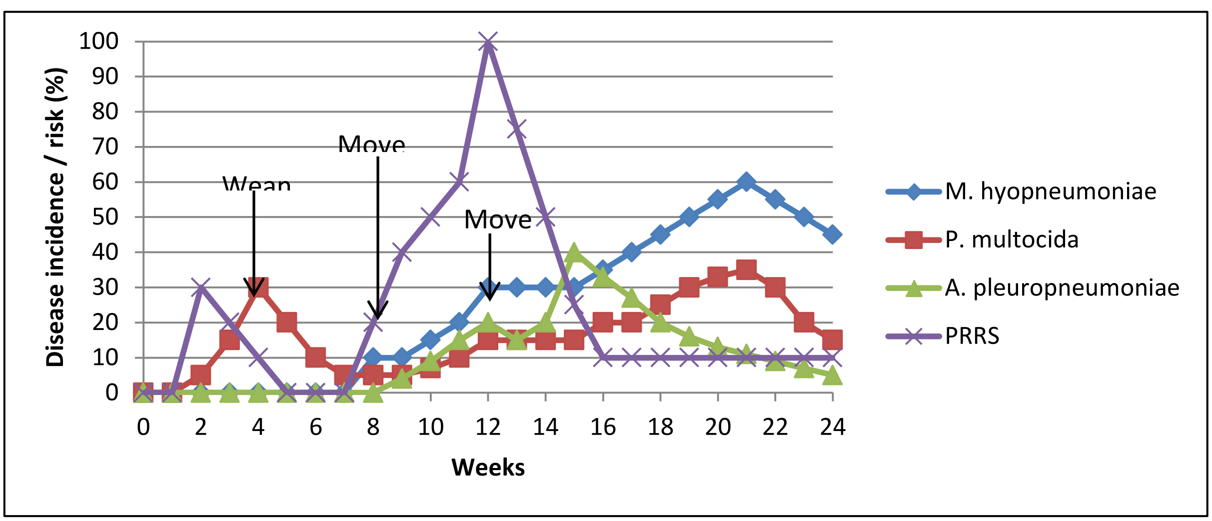

Figure 3. Overview of common respiratory agent infection patterns.

Atrophic rhinitis

Atrophic rhinitis is rarely seen or reported in the UK these days. It was shown to be caused by a dual infection of *Bordetella bronchiseptica* and *Pasteurella multocida*, which produced a dermonecrotoxin that damaged the nasal tissue. Pasteurella rarely causes respiratory problems in pigs on its own.

Mycoplasma hyopneumoniae (enzootic pneumonia)

Enzootic pneumonia (EP) is caused by *Mycoplasma hyopneumoniae*. Mycoplasma can be passed on from sow to piglet but generally it is thought to be more due to older pigs on the same site contaminating naive piglets. Poor ventilation can exacerbate the problem and it takes several weeks for the lesions to develop. One may hear coughing as early as 7-8 weeks of age as stocking density/ventilation is unsuitable but generally it is later on in the nursery and grower phase where it builds up. *Pasteurella multocida* come in at about 50% of EP infections and complicates the problem causing bronchopneumonia. The coughing is acute and they may have increased temperatures and may die if not treated promptly. The presence of PRRS virus also complicates the problem causing the porcine respiratory disease complex (PRDC).

Actinobacillus pleuropneumoniae

Actinobacillus pleuropneumoniae is often thrown in on top of PRDC, although it is a primary pathogen. Mortality can increase from an average of 2-3% to nearly 5% with complicated PRDC. This is the time to start considering depopulation/repopulation with healthy clean stock or partial depopulations and eradication programmes using vaccines and medication.

SYSTEMIC DISEASES

The common septicaemic/bacteraemic causing infections commonly found in weaner pigs are summarised in Table 5 and Figure 4.

Table 5. Common septicaemic bacterial diseases in the pre-weaned and weaned pig.

Bacterial species	Disease	Age
Streptococcus suis	Meningitis, endocarditis, arthritis, peritonitis	2-10 weeks
Haemophilus parasuis	Glässer's disease (arthritis, pericarditis, peritonitis)	2-10 weeks
Actinobacillus suis	Septicaemia	5-28 days
	Pleuro-pneumonia	Weaning to slaughter
Mycoplasma hyorhinis	Synovitis, arthritis	8-10 weeks
Mycoplasma hyosynoviae	Mycoplasmal arthritis	16 weeks plus
Erysipelothrix rhusiopathiae	Erysipelas (dermatitis, arthritis, endocarditis)	Growers, finishers and sows

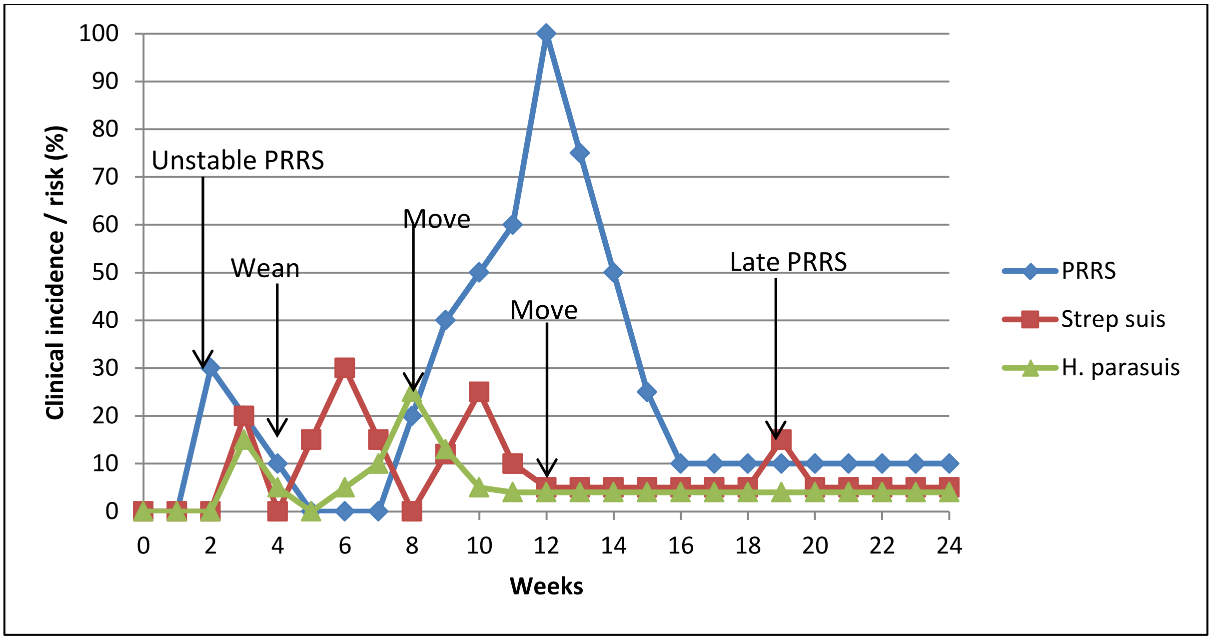

Figure 4. Overview of common septicaemic agent infection patterns.

Streptococcus suis

There are about 35 serotypes but type 1, 2 and 14 are the most common in the UK. They colonise the tonsil, and after a stress, appear to penetrate into the bloodstream and can cause bacteraemia or may multiply and become a septicaemia. The classic septicaemia is the spread around the whole body (where the blood goes) so the organism may settle out almost anywhere. There are predilection sites such as the meninges and brain, hence it readily develops into streptococcal meningitis but can also penetrate joints, the heart and causes endocarditis and pericarditis, the pleura and cause pleurisy and the abdomen causing peritonitis – all the serosal surfaces. Fortunately, they are generally controlled by penicillins and there has been very little resistance development. There are also commercial vaccines for type 2 as well as autogenous vaccines. The stress after weaning can often precipitate a problem and in the UK it is when the weather and temperatures are very variable in spring and autumn. Meningitis is the common problem with pigs lying on their sides, paddling or are found dead. Polyarthritis is also quite common. On some farms it occurs in the growers again after a move or stress. The PRRSV also destabilises the immune response/protection and meningitis can occur especially when there is a PRRSV breakdown, even in finishing pigs.

***Haemophilus parasuis* (Glässer's disease)**

This is very similar in many ways to *S. suis,* another **'suiscide'**. Again a tonsillar coloniser, it can penetrate the blood stream and can cause septicaemia, and once there can settle out almost anywhere. The common sites though were classically joints – Glässer's disease – but one can get coughing, pneumonia, pleurisy, peritonitis and death. Again there are 15 serotypes and the commercial vaccines are helpful in about 60% of the cases but are not usually giving 100% coverage. Fortunately, they are mainly susceptible to antibiotics. The PRRSV also seems to play a role when the disease is unstable in a herd and can occur before weaning or after.

Actinobacillus suis

Fortunately, it is very rare in the UK (1 reported case) but can cause problems in herds in N. America. It is similar to the other 'suiscides' and generally controlled by antibiotics.

Mycoplasma hyorhinis

Mycoplasma hyorhinis is a common organism on a herd basis but does not always seem to be disease associated. It colonises the respiratory tract like *M. hyopneumoniae* and has been shown to cause low grade pneumonia lesions but does appear to go into the blood stream more easily and settle out in joints and synovial surfaces causing mild to moderate inflammation and swellings on the joints, especially in the hocks etc. Strategic medication can usually control it if it is serious enough a problem.

Mycoplasma hyosynoviae

This can colonise young pigs and they usually develop immunity without developing disease. It is only later on in the finishers that it can cause a polyarthritis and lameness (see Figure 5). There are two forms. If the piglets are weaned away from the sow unit, they may not actually develop immunity and then they receive a challenge when they are 60kg plus and that usually is the most severe form, especially seen in replacement gilts and boars. It has increasingly been reported in the US in finishers. Stress can induce a bacteraemia and often lameness is seen in gilts after transport, 2-3 weeks after arrival.

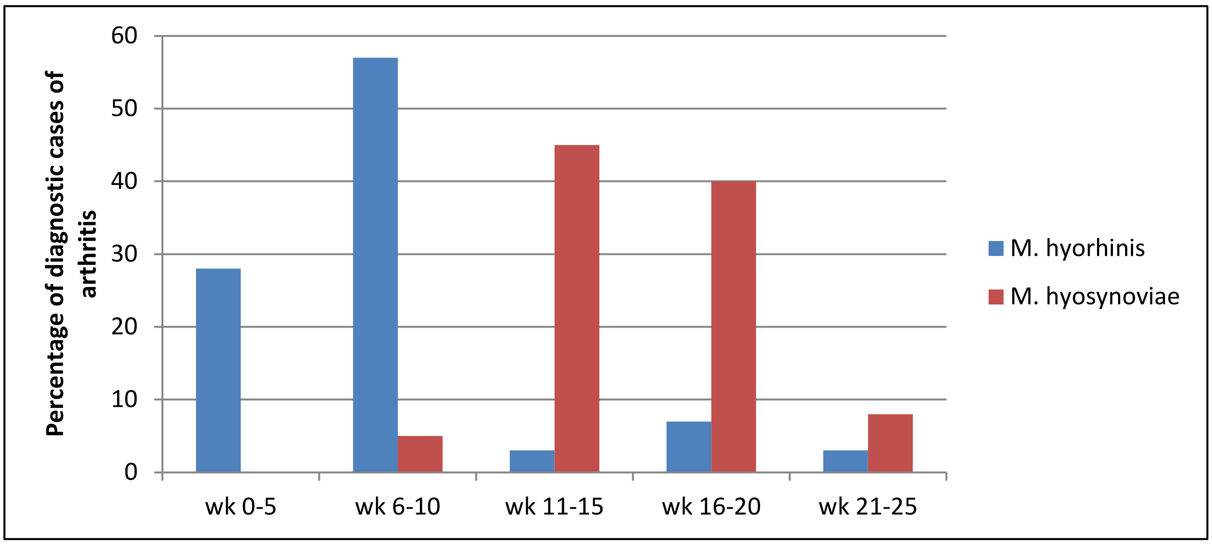

Figure 5. Comparison of the incidence of *M. hyorhinis* and *M. hyosynoviae* diagnostic cases (Gomes Neto et al., 2012).

Erysipelothrix rhusiopathiae

A common cause of lameness and pericarditis in severe, peracute cases but generally the first indications are the diamond shaped skin lesions. Sows are usually vaccinated and this provides protection to the piglets and weaners up to 10 weeks of age. In problem farms vaccinating the young stock is also carried out. Most farms take pot luck in the UK. We saw a lot of peracute cases, when we were trying to clean up herds. The bug is ubiquitous in the ground and can be carried by birds so picking it up is relatively easy. It does respond to antibiotics but if damage is done internally chronic forms of the disease – heart problems and lameness – can be an issue.

CONCLUSIONS

Although the climate is very different in Canada, many of the diseases are similar. They have similar patterns hence when examining herds it is useful to track through by age group to monitor the presence of enteric problems – diarrhoea and poor condition; respiratory signs – sneezing, coughing, pneumonia, treatment marks and mortality. Lameness, swollen joints and cases of meningitis are also useful to observe. What medications and vaccinations are being used and are they effective is also helpful to get an overall picture of a farm. At the end, necropsies of typical cases give you a good overview of what is going on. Samples can be taken and sent away for testing, for bacterial culture and sensitivity testing, PCR and serology, histology, all add up to the overall picture and diagnosis and what may be the best ways to control them.

LITERATURE CITED

BPEX. 2015. The BPEX yearbook 2014-2015. Published by AHDB pork.

Burch, D.G.S., C.O. Duran, and F.M. Aarestrup. 2008. Chapter 7. Guidelines for Antimicrobial Use in Swine. In (L. Guardabassi, L.B. Jensen & H. Kruse, Eds) Guide to Antimicrobial Use in Animals. Blackwell Publishing, Oxford, UK. pp. 102-125.

Gomes Neto, J.C., P.C. Gauger, E.L. Strait, N. Boyes, D.M. Madson and K.J. Schwartz. 2012. *Mycoplasma*-associated arthritis: Critical points in diagnosis. J. Swine Health and Prod. 20: 2, 82-86.

ISBN 978-1-927026-05-2

www.octagon-services.co.uk