

# FORGOTTEN DISEASES

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## ABSTRACT

There are other diseases besides PRRS and PCVAD that need to be given some attention. The common but less dramatic diseases that result in reduced growth and poor feed efficiency are still with us and can have a significant impact on profitability. Examples of these diseases that tend to fly under the radar screen include coccidiosis, porcine proliferative enteropathy, and swine influenza. There are other diseases that may not have a direct impact on pig performance but are important to the swine industry because they potentially have public health implications and therefore it is important for producers to be aware of these pathogens. Among the many organisms that have zoonotic potential, *Salmonella* are probably the bacteria that pose the greatest problem for the Canadian swine industry, but there are others that we need to study and monitor.

## INTRODUCTION

In the past two years the Ontario swine industry has struggled with two major health challenges: Porcine Respiratory and Respiratory Syndrome (PRRS) and Porcine Circovirus Associated Disease (PCVAD). Understandably, producer and veterinary meetings have had little room on the agenda for other disease issues, and so one could be excused for believing that all the other diseases somehow disappeared. The purpose of this presentation is to remind everyone that there are other health problems in addition to PRRS and PCVAD. I will outline these diseases under the categories of: production diseases, and public health concerns. In addition I will try to discuss some of the research work being conducted at the University of Guelph with regard to these health problems.

## PRODUCTION DISEASES

### **Reducing Stillbirths and Ensuring Adequate Colostrum**

Stillbirth levels on most farms range from half to one pig per litter representing a significant economic loss. In addition, lack of neonatal supervision can result in some of the piglets not receiving adequate colostrum. This has a major impact on piglet survival and can result in the spread of disease into the nursery from the farrowing room because of sick or carrier piglets. In an effort to improve colostrum management we have studied methods of inducing farrowing and monitored the impact of neonatal intervention. In one study we examined the

use of a half dose of prostaglandin injected into the vulval mucosa of sows and then repeated 6 hours later to consistently induce farrowing at a time when births could be supervised and piglets assisted to suckle, ensuring colostrum intake. In our research trials supervised farrowing resulted in reduced stillbirths (0.38 vs. 0.99 pigs per litter) and guaranteed all piglets in a litter were protected by receiving antibodies from their mother. We used a syringe to orally feed weak piglets with colostrum and supervised nursing. This level of care is likely needed to prevent one or two small piglets from missing out on protective colostrum and then becoming susceptible to disease at an early stage and posing a risk to all the other pigs.

## **Coccidiosis**

*Isospora suis* (coccidia) is a protozoan parasite that reproduces in cells lining the villi of the small intestine of pigs. The disease is characterized by a pasty diarrhea occurring in pigs between 1 and 3 weeks of age and is generally thought to result in reduced growth rate but low mortality. Current information on the prevalence and impact of coccidiosis in Canadian pigs is not available – the last prevalence study was carried out in the late 1970s. In most countries the only drug that has been licensed for prevention of coccidiosis in piglets is toltrazuril (Baycox) – administration of a single dose in the first week of life has been shown to be effective and may have significant economic benefits. Although toltrazuril was never licensed for use in Canada, it was commonly used under veterinary supervision with an emergency import permit. Unfortunately, in 2005, the use of the drug in pigs in Canada was banned.

As a first step in trying to convince the drug companies and the regulatory bodies that a coccidiostat for pigs is needed we conducted a study to determine the prevalence of the disease in Ontario. We visited 50 farms and gathered fecal samples from suckling piglets. We found evidence of coccidia on 75% of farms and an association between the presence of diarrhea and coccidia. Currently we are looking at potential treatment or control techniques. The impact of this disease is subtle but it likely is responsible for causing lighter weaning weights and uneven growth in the early nursery on many farms.

## **Post Weaning *E. coli* Diarrhea**

Post-weaning diarrhoea in pigs is a complex disease with multiple contributing factors. In the late 1990's an outbreak of disease occurred in Ontario characterized by sudden death and severe watery diarrhoea in newly weaned pigs. An investigation was undertaken to determine whether the disease was caused by a change in management and/or nutrition or whether *E. coli* had become more virulent. In addition a series of trials, both clinical field studies and controlled challenge studies were undertaken to determine the efficacy of various control measures. In a case-control study of 50 farms it was determined that management factors did not appear to be associated with an increased risk of disease. The most common *E. coli* isolated from cases of diarrhoea O149 F4 (STa, STb, LT) was shown to be different from the predominant strains isolated from cases a decade earlier, suggesting that the disease was in part due to a more virulent pathogen. Novel approaches to control of the disease including vaccination, egg-yolk antibody products, probiotics, essential oils and bacteriophages were

investigated. Certain of these intervention strategies showed promise in the laboratory and in controlled studies but their effectiveness under the field conditions remains in doubt.

### “Sui-cide” Diseases (Glasser’s, Strep meningitis, APP and *Actinobacillus suis* infection)

One aspect of PCVAD is the weakening of the immune system and consequently the emergence of disease caused by bacteria that are generally not very pathogenic. The so-called “sui-cide” diseases have become more important in herds battling PCVAD and PRRS. We have been monitoring these weaker pathogens, including *Streptococcus suis*, *Actinobacillus pleuropneumoniae*, *Actinobacillus suis*, and *Haemophilus parasuis*.

Tonsillar and nasal swabs were collected from weanling pigs in 50 representative Ontario swine herds and tested for the presence of five important bacterial upper respiratory tract pathogens. All but one herd (2%) tested positive for *Streptococcus suis*; 48% of herds were *S. suis* serovar 2, 1/2 positive. In all but 2 herds there was evidence of *Haemophilus parasuis* infection, the causative agent of Glasser’s Disease. In contrast, toxigenic strains of *Pasteurella multocida*, the cause of atrophic rhinitis, were detected in only one herd. Eighty percent of the herds were diagnosed positive for *Actinobacillus pleuropneumoniae*. Sera from finishing pigs on the same farms were also collected and tested by ELISA for the presence of *A. pleuropneumoniae* antibodies. Seventy percent of the herds tested had evidence of antibodies to *A. pleuropneumoniae* including serovars 1-9-11 (2%), 2 (4%), 3-6-8-15 (15%), 5 (6%), 4-7 (26%), and 12 (17%). This likely represents a shift from previous years when infection with *A. pleuropneumoniae* serovars 1, 5, and 7 predominated. Possibly as many as 92% of the herds tested were *Actinobacillus suis* positive; only 3 of the 50 herds were both *A. pleuropneumoniae* and *A. suis* negative. Taken together, these data suggest that over the past 10 years, there has been a shift in the presence of pathogenic bacteria carried by healthy Ontario swine with the virtual elimination of toxigenic strains of *P. multocida*, the cause of atrophic rhinitis, and a move to less virulent *A. pleuropneumoniae* serovars. As well, there appears to be an increase in prevalence of *S. suis* serovar 2, 1/2, but this may be a reflection of the use of a more sensitive detection method.

Drs. Brooks and Hayes in the Pathobiology Department and Dr. Squires from Animal and Poultry Science at Guelph are also investigating the possibility that the emergence of more serious problems with diseases such as Streptococcal meningitis or polyserositis caused by *H. parasuis* is due to genetic defects in the pig’s innate immune system. These researchers have identified specific gene defects that appear to be associated with higher morbidity and mortality. This work will hopefully progress to the point where tests will be available to identify breeding animals carrying these defects and we will be able to select for more disease resistant animals.

### Swine Influenza

Swine influenza viruses are common on many pig farms and contribute to respiratory disease problems and slow growth rates but are frequently ignored or under-diagnosed. Most of the interest and funding for our influenza research work in the past few years has come from the

Ontario Ministry of Health and Long Term Care because of the public health concerns associated with swine flu and avian flu. New strains of swine flu have entered Ontario.

The epidemiology of influenza in the North American swine population has changed since the emergence of a triple-reassortant H3N2 influenza virus. Although seen previously in North America, the Ontario swine population was likely free of viruses of the reassortant H3N2 lineage until 2005. We have examined the outbreak of clinical disease associated with influenza over the past few years. In total, 919 and 978 sera collected in cross-sectional studies from 46 and 49 finisher herds in 2004 and 2005 were tested by a H1N1 subtype-specific and a H3N2 subtype-specific commercial ELISA. For the H1N1 subtype, the point prevalence of positive herds (>2 reactors) was 26.1% and 36.7% in 2004 and 2005, respectively. For the H3N2 subtype the point prevalence of positive herds (>2 reactors) was 6.5% and 42.9% in 2004 and 2005, respectively. This work documented the sudden appearance and then rapid spread of the new strain of flu. Current biosecurity procedures were inadequate to prevent the movement of this virus from herd to herd in regions of dense pig production. This work also demonstrated that on some Ontario farms there are at least two separate strains of influenza virus circulating in the pig population.

## **DISEASES OF PUBLIC HEALTH CONCERN**

### **Salmonellosis**

*Salmonella* can cause diarrhea and reduced growth rate but historically salmonellosis has not been a major problem in the Ontario industry, but the prevalence of clinical disease may be increasing. More importantly, *Salmonella* is a concern from a food safety standpoint, and control and monitoring programs are being put into place in some pork exporting countries. We have tested a sample of 113 farms in Ontario over a 5-year period from 2001 to 2006, with 54 farms visited all 5 years. *Salmonella* were recovered from 60% of the herds at least once, but there were 13 farms that were tested for 5 straight years and considered negative each year. This may still be a low estimate of the prevalence of *Salmonella* positive herds because in our sampling we concentrated on examining the pigs close to market weight. In a separate study we looked at pigs of varying ages and found that the highest prevalence was generally the weanling and young growing pigs. As the pigs get older they are less likely to shed the organism. So it is possible if we repeated our survey of Ontario herds but sampled younger animals the prevalence could be higher. The most common serovar of *Salmonella* was *S. Typhimurium* and the most common phage type was DT104. This particular *Salmonella* is a major concern because it is associated with multiple antimicrobial resistance.

We have done some work at controlling *Salmonella* at the farm level. Antibiotics tend to be ineffective. All-in/all-out flow and thorough cleaning and disinfection are generally advocated but there is little evidence that they are useful. Feed does have an impact, with the use of finely ground pelleted feed being associated with more *Salmonella* and coarse feed and fermented liquid feed associated with lower levels of *Salmonella*. We have been studying a variety of alternative control measures such as acidifiers, probiotics, bacteriophages and essential oils.

## **Other Diseases of Public Health Concern**

We have examined fecal samples from pig farms for the presence of agents that could pose a health risk to humans. We have sporadically isolated *E. coli* O157:H7, (the bacteria associated with Walkerton) on a small number of farms and in low numbers demonstrating that it can occur but cattle remain a far greater concern. We have isolated *Yersinia enterocolitica* from about 20 % of farms during cold months, and the serotypes and biotypes of these bacteria found in pigs match closely the bacteria isolated from human cases of food poisoning. This is a relatively uncommon cause of human disease but when it occurs, pig meat is a likely source. In contrast *Campylobacter* is the most common cause of human illness associated with food contamination, and although our work shows all pigs carry *Campylobacter* the serotypes and antimicrobial resistance patterns suggest that the pig *Campylobacter* is different than the common bacteria infecting humans. Poultry is likely the primary source.

Very recently there has been a lot of press coverage regarding “superbugs”, mainly referring to bacteria in hospitals that have become resistant to almost everything because of the heavy antibiotic use and sanitation pressure. In particular Methicillin-Resistant *Staphylococcus aureus* (MRSA) has become a major concern because it is moving out of the hospitals and into the community. In the Netherlands, researchers discovered that pig farmers were 700 times more likely to carry MRSA than the general population suggesting that pigs were a source. Preliminary results of a small study we are conducting indicate that MRSA is widespread in the Ontario pig population. We will need to do further studies to determine if this finding has any significant health implications for pig farm workers.

## **CONCLUSIONS**

The disease picture on Ontario farms is constantly changing. As one disease disappears a new one, or possibly an old one in a new form, emerges. It is important that we not only monitor the most obvious and costly disease(s) but also study less significant pathogens as well.