

# Proceedings of the



18<sup>th</sup> LONDON SWINE CONFERENCE

**March 27-28, 2018**

London, Ontario

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PROCEEDINGS

*of the*

**LONDON SWINE CONFERENCE**

*Edited by*  
J.H. Smith and L. Eastwood

March 27<sup>th</sup> and 28<sup>th</sup>, 2018

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## Proceedings of the London Swine Conference

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# Where Research Meets Production

Tuesday March 27 & Wednesday March 28

## Chair's Message



Paraphrasing Benjamin Franklin, tell me and I forget, but involve me and I learn. Each speaker at this year's London Swine Conference is here to involve you in their corner of the swine industry. From veterinarians to researchers, marketing specialists to pork producers, this year's lineup is not to be missed.

Over two days at the 2018 conference, we'll focus on daily farm operations as well as planning for the future of your business. Amy Matheson from Farm & Food Care Ontario will lead one of our main sessions, about how to tell your story as a farmer and a representative of the industry.

In our other main sessions, we will hear about sow health (Sow Body Condition for Breeding Success); human resources issues on farm (Family & Business & Staff – Oh My!); and swine diets (CFM de Lange Lecture: Innovative Diet Formulation).

Take in our main sessions as well as a wide range of workshops — both are a chance to learn from informative speakers as well as from each other.

During panel discussions, we're asking about the challenges producers and industry professionals have dealt with — good, bad and everything in between. Take advantage of the peer-to-peer learning in these sessions and during conference net-working — I find that our peers can be some of the most valuable learning resources.

Thanks go out to our dedicated conference organizers — we appreciate the hours of planning and execution that have gone into making this conference one to remember.

**Teresa Van Raay**

*Steering Committee • 2018 London Swine Conference*

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## London Swine Conference

Thank you to all our sponsors and participants for investing in the future of our industry by supporting the London Swine Conference.

We look forward to seeing you again in 2019.

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# **Day 1: Main Sessions**

## **TELLING YOUR STORY**

**Amy Matheson  
Farm & Food Care Ontario**

The Speak Up team concept was developed more than 15 years ago and has now expanded across the country with courses given to farmers and others working in agriculture in every province. The training gives participants the ability to tell their stories, in an easy-to-understand and compelling manner. This could be of use in media interviews, in farm tours, at council meetings, to service club members, to school groups and more.

For people who work in agriculture, it's sometimes hard to find the words when tough questions or inaccurate claims are raised. The Speak Up! workshop describes the average Canadian consumer, what they know about farming and how they think about food. It gives participants the ability to tell their stories in an easy-to-understand and compelling manner and explains how to have a positive, meaningful conversation about food and farming, providing pointers on handling difficult subjects. This is valuable for media interviews, farm tours, council meetings, service clubs, school groups and other situations where you are tasked with answering tough consumer questions about how food is produced.

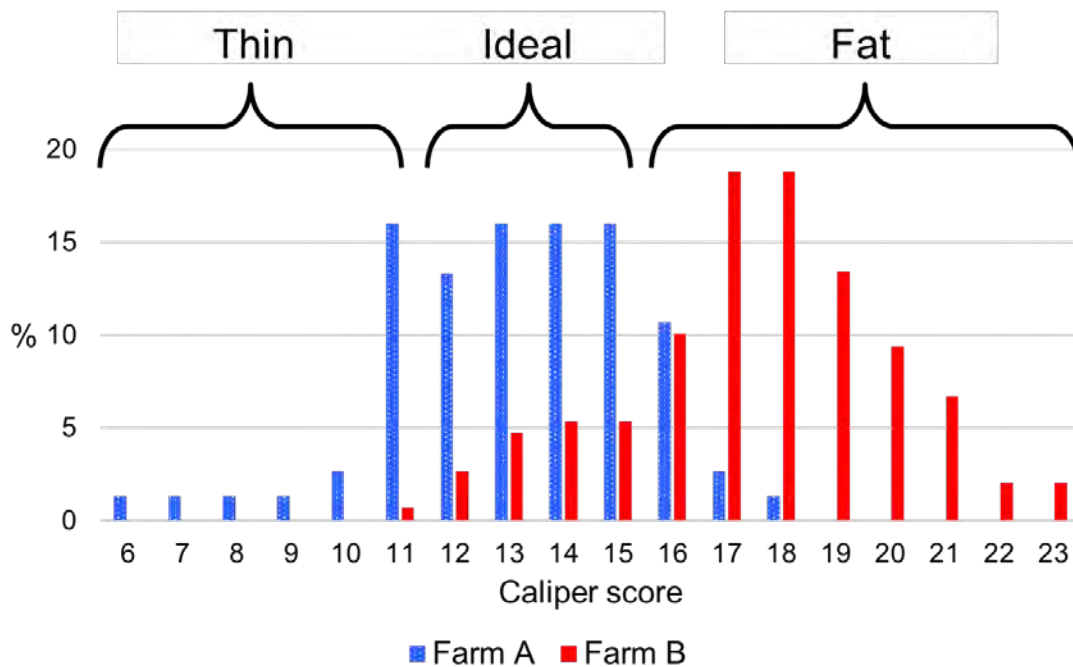


## SOW BODY CONDITION FOR BREEDING SUCCESS

Mark Knauer  
Department of Animal Science  
North Carolina State University  
Campus Box 7621, Raleigh, NC 27695  
[mtknauer@gmail.com](mailto:mtknauer@gmail.com)

### INTRODUCTION

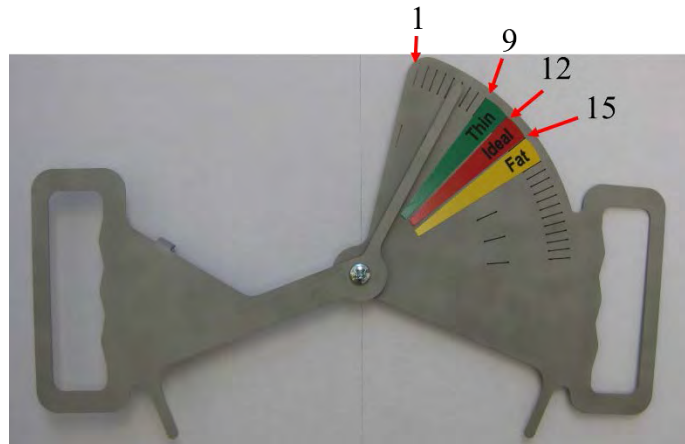
Sows are commonly fed during gestation based on a subjective body condition target. Yet the perceived “ideal” target for sow body condition varies between individuals (Charette et al., 1996; Fitzgerald et al., 2009). These differences in opinion cause across herd variation in sow body condition. In other words, what is deemed as proper sow body condition in one herd may be viewed as under or over conditioned by another individual (Table 1). Proper evaluation of sow body condition can reduce feed costs, enhance reproduction and improve animal well-being. Therefore a cost effective, objective measure of sow body condition would allow for needed standardization across farms.



**Figure 1.** Sow body condition (scored by a sow body condition caliper) in two farms within the same production system. Farms had the same genetics, same facilities and feed was formulated by the same nutritionist. Perhaps the main difference between the two farms was the individual’s ability to visually evaluate body condition and adjust feed drop boxes.

## DEVELOPMENT OF THE SOW CALIPER

Wright and Russel (1984) suggested body condition is a composite trait of weight, backfat and muscling. Using this concept, Knauer and Baitinger (2015) invented the sow body condition caliper (Figure 2). The technology quantifies the angularity from the spinous process to the transverse process of a sow's back. The sow caliper is based on the premise that as a sow loses weight, fat and muscle her back becomes more angular (Figure 3).

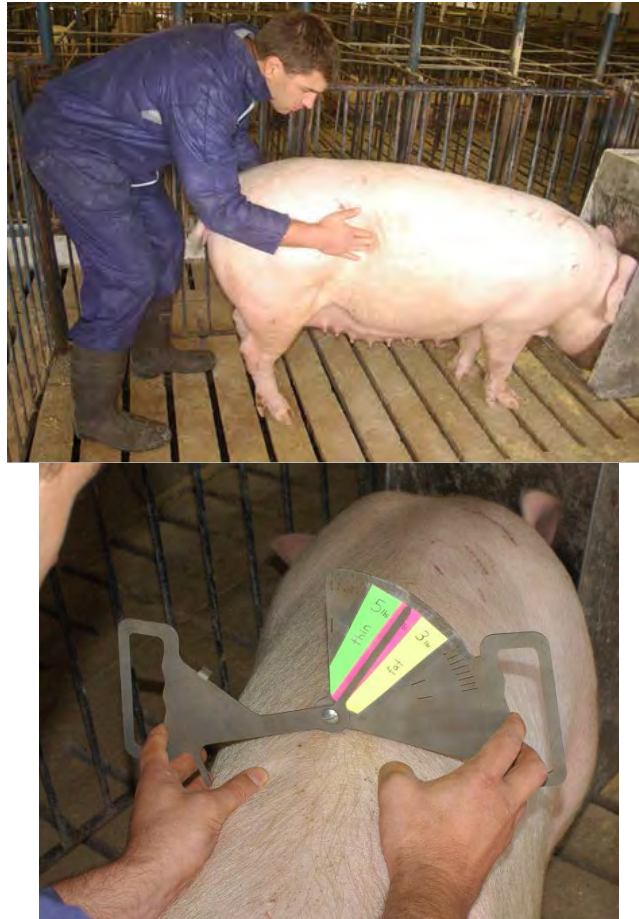


**Figure 2.** The sow body condition caliper invented by Knauer and Baitinger (2015). A lower number represents a “thinner” sow and a greater number represents a “fatter” sow. “Thin”, “Ideal”, and “Fat” labels have been created based on production research (see Figure 5).



**Figure 3.** Differences in angularity between a “thin” sow (left) and a “fat” sow (right). The sow body condition caliper quantifies the angle of a sow's back.

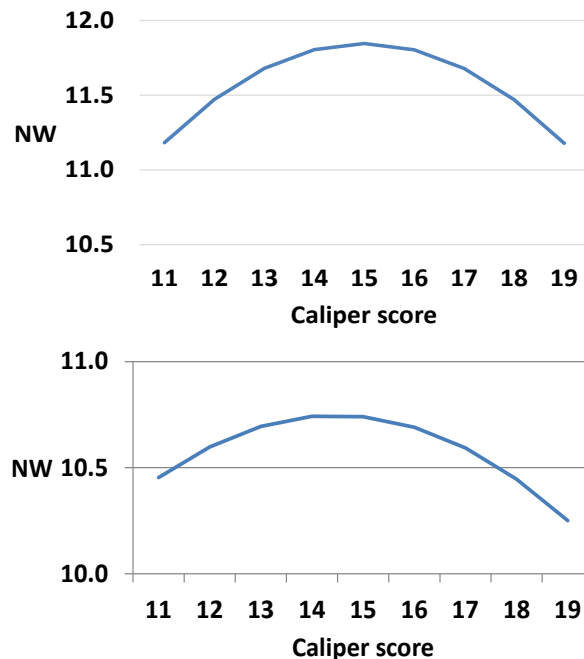
The sow body condition caliper is designed to be used at the sow's last rib (Figure 4). Beginning users of the tool should palpate each sow to become comfortable with the location of the last rib. Advanced users should be able to guesstimate last rib location, thus reducing time needed to obtain a measurement.



**Figure 4.** A technician palpates for a sow's last rib (top) and captures a sow caliper score (bottom).

#### **IDEAL BODY CONDITION IN RELATION TO REPRODUCTION**

Our group has completed two studies (> 1,000 sows each) relating sow body condition to subsequent reproduction. Both studies were completed in North Carolina production systems that differed in sow gestation housing, genetics and nutrition. Yet the “ideal” body condition in relation to subsequent reproduction was comparable across studies (Figure 5). Results from Bryan (2014) suggest piglet survival accounted for differences seen between caliper scores in relation to number of piglets weaned.



**Figure 5.** Association between sow body condition caliper score and number weaned (NW) in two different North Carolina production systems.

### IMPLEMENTATION OF THE SOW BODY CONDITION CALIPER

The sow body condition caliper has been distributed to 24 states within the United States and 21 countries around the world. Within North Carolina, every major production system has multiple sow calipers. Implementation ranges from multiple sow calipers per farm to several sow calipers across an entire production system.

Does your sow farm need a body condition caliper? If your employees consistently have 90% of sows in “ideal” body condition at farrowing, implementing the sow body condition caliper may not impact your farm’s profitability. Yet if you are overfeeding sows in gestation, using a sow caliper can provide a high return on investment.

Using the sow body condition caliper can help train individuals to visually evaluate sow body condition. Hence farms with limited labour may use the sow caliper to train individuals to visually evaluate sow body condition.

Time needed to successfully implement the sow body condition caliper may vary greatly between farms. Questions regarding implementation can be sent to Mark Knauer at [mtknauer@gmail.com](mailto:mtknauer@gmail.com).

### COMMON SOW CALIPER QUESTIONS

Does the sow caliper work on different genetics? Our research suggests the sow body condition caliper can work across different modern genetic lines (Figure 5).

Does the sow caliper work on gilts? Yes, the caliper has a low or no correlation with parity. Yet gilts developed on ad libitum feeding programs may score somewhat into the “fat” range (caliper score of 16 or 17). We currently believe this is fine as gilts have not yet had an opportunity to lose weight in lactation. Yet a gilt with a caliper score of 18+ is very over conditioned. A high percentage of over conditioned gilts warrants reviewing your gilt development program.

How many times should you measure sows throughout gestation? Each farm must identify the feeding level at which sows maintain body condition. This will take some trial and error to identify. Once this level is found, sows may only need to be measured a few times throughout gestation. At weaning or breeding, pregnancy check and two weeks prior to farrowing are good opportunities to adjust feeding levels.

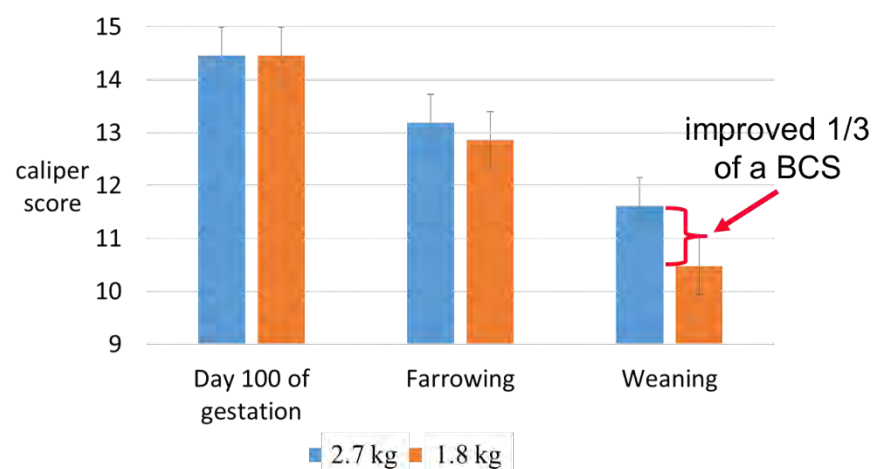
Could my farm’s “ideal” body condition, in relation to reproduction, be different than your recommendations? Yes, but likely only slightly different.

How do I keep my employees from dropping the sow caliper through the slats? Have them attach the caliper to their wrist using rope, etc.

Where can I purchase a sow body condition caliper? Sow calipers can be purchased through Mark Knauer at [mtknauer@gmail.com](mailto:mtknauer@gmail.com).

## PREVENTING THIN & FAT SOWS

Good gestation and lactation management can help prevent thin sows. In gestation, cull a “thin” sow if she does not respond to increased feeding levels. Sows that do not gain body condition with increased feeding levels may have internal issues such as a stomach ulcer. Preventing “thin” sows in lactation starts in late gestation. Evaluate sow body condition two to three weeks before farrowing and increase feeding levels for any “thin” sows (Figure 6). In lactation, maximize feed intake to prevent “thin” sows. If a sow’s body condition falls to a certain level, perhaps a caliper score of 8, wean her.



**Figure 6.** Knauer (2016) improved sow body condition at weaning by increasing feeding levels at day 100 of gestation.



Bringing “fat” sows back to “ideal” body condition can be challenging. Hence prevention is key. Do not try to bring “fat” sows back to “ideal” in gestation by dropping their feeding level below nutritional requirements as this can impair piglet birth weight (Knauer, unpublished). Do not bump feed “fat” sows in late gestation. Perhaps the best time to correct “fat” sows is during lactation by optimizing feed intake or extending lactation length.

## **CONCLUSIONS**

The sow caliper will allow for needed standardization in sow body condition across individuals and farms. Return on investment for the sow body condition caliper will range from marginal to very high. Proper implementation of the sow caliper should help reduce the number of “thin” and “fat” sows within a production system.

## **ACKNOWLEDGEMENTS**

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## FEED ADDITIVES – THE MYTHS AND FACTS

Joel DeRouchey,<sup>1,2</sup> Mike Tokach<sup>1</sup>, Bob Goodband,<sup>1</sup> Steve Dritz,<sup>3</sup> and Jason Woodworth<sup>1</sup>

Kansas State University: <sup>1</sup>Department of Animal Sciences and Industry,

<sup>3</sup> Department of Diagnostic Medicine/Pathobiology

<sup>2</sup>222 Weber Hall, Manhattan, KS 66506

[jderouch@ksu.edu](mailto:jderouch@ksu.edu)

### ABSTRACT

The use of feed additives in swine diets with the intention to improve growth, nutrient digestibility, health or other claims is not a new concept. The challenge for producers, nutritionists, veterinarians and allied industry that develop and market feed additives is the ability to measure and economically evaluate their efficacy. There are classes of feed additives that give consistent responses while others are quite variable. Producers must be diligent in understanding the added feed cost and potential economic return of their use.

### INTRODUCTION

The purpose of this presentation is to educate producers on a variety of feed additives that are used in swine diets. The goal of feed additives in swine diets generally are: 1) Replace the growth lost in nursery from removal of antibiotics or 2) to improve growth or “gut health” of nursery and growing pigs. The term “gut health” gets used in many cases incorrectly or more to the fact we do not have a better way to describe what our aim is for their use. While some are marketed for use in sows, less utilization is focused in that area of production. This paper will briefly describe different feed additives that are generally related to one or both of the aforementioned goals.

### UNDERSTANDING ANTIBIOTICS IMPACT ON PERFORMANCE

So what is the impact of antibiotics on growth rates? Under commercial conditions, it has been shown that including growth promotion levels of antibiotics in the nursery can improve ADG by approximately 5% with no change in feed efficiency (Dritz et al., 2002). This is a routine finding as feed intake generally increases to drive the ADG effect. However, in finishing pigs under modern conditions, the authors reported that growth promotion levels of antibiotics had no effect on growth parameters. Thus as producers, veterinarians, and nutritionists develop strategies for replacing in-feed antibiotics, expectations on how feed additives can be used to replace the lost performance in the nursery, but not the finisher, should be the focus of the decision process.

### CONFIDENCE IN FEED ADDITIVES

To gain a greater understanding of the current knowledge of feed efficiency and production practices that may have the greatest opportunity with efficiency of gain, an industry wide survey was conducted in 2011 (Flohr et al., 2014). The authors reported that the “non-antibiotic Feed Additive” class was an area where industry knowledge was

lacking compared to other parameters related to feed efficiency. However, the respondents also indicated that the opportunity for feed additives to improve feed efficiency was very low compared to areas such as herd health, genetics, and feed processing as examples. This helped capture general industry thoughts on feed additives, where past confusion and frustration on their consistency and efficacy in swine diets to influence health or growth performance is routine.

## ENZYMES

Enzymes are proteins that can be used to target different substrates in the diet to accelerate their breakdown. Most typically the enzymes used in swine diets include phytase, protease,  $\beta$ -glucanase,  $\alpha$ -amylase and cellulose. While phytase has been shown to be effective to improve phosphorus digestibility (Jacela et al., 2010a), carbohydrate-degrading enzymes have been less consistent in demonstrating responses (Jacela et al., 2009). From a growth promotion standpoint, using “super dose” or “Beyond P” levels of phytase, often 3-4 times the level normally included in diets (1,500-2,000 FTU/kg compared to 500 FTU/kg) has been consistent in improving growth in nursery but more variable in finishing. It is currently routine that 1,500-2,000 FTU/kg are used in nursery diets across the US and Canada to promote growth rates.

## PROBIOTICS

Probiotics are live cultures of organisms supplemented in pig diets that can beneficially affect the host animal by improving the microbial balance in the gut (Fuller, 1989). In a review of 44 published experiments using probiotics, they reported numerical improvements in ADG was observed in over 70% of the experiments reported while only 6.8% of the experiments reported improvements in ADG that were statistically significant. The inconsistency in responses to probiotics reported may also be partially explained by the use of different DFM strains (Simon et al., 2003). Organisms commonly used include *Lactobacillus acidophilus*, *Enterococci faecium*, *Bacillus species*, *Bifidobacterium bifidum*, and the yeast *Saccharomyces cerevisiae*. Also, in a separate review, the author indicated that results of growth performance trials with probiotics have been inconsistent (Jacela et al., 2010b). From a historical perspective, different strains that showed efficacy in other livestock species such as dairy and poultry were then marketed for swine. This has contributed to a lack of response and overall scepticism of this class of feed additives to have efficacy in swine diets.

Currently, there is more focused research to develop specific stains of probiotics for swine targeting more specific GIT known bacteria challenges. This type of research and development is needed to have a more consistent benefit and build trust that this class of feed additives can be beneficial.

## PHYTOGENICS

Phytogenic feed additives include herbs, spices, and essential oils. In a review of trials evaluating phytogenics, available evidence indicates that phytogenic feed additives may

have potential benefits (Windisch et al., 2008). However, current research data show that growth responses to phytogenic feed additives are still inadequate compared to in-feed antibiotics (Jacela et al., 2010b). There is a need for a systematic approach to explain the efficacy and mode of action for each of type and dose of active compound, possible interactions with other feed ingredients, and safety of phytogenic compounds used as feed additives for swine. Currently, an overall lack of confidence exists for this class of feed additives to provide a consistent and meaningful growth response in swine.

## **ACIDIFIERS**

Acidifiers are compounds that have acidic properties: they may be organic or inorganic acids, and their use in commercial nursery diets is relatively common. Research suggests that age of pigs can affect the response to acidifiers, with newly weaned pigs showing the greatest response (Ravindran and Kornegay, 1993; Bergstrom et al., 1996). Acidifiers are most beneficial during the first few days after weaning. The stomach of a weaned pig is not yet physiologically mature and may not be able to secrete a sufficient amount of acid to aid in digestion of solid food or inhibit proliferation of detrimental bacteria. However, the exact mechanism of the response to acidifiers is not clear.

In a review of experiments that evaluated acidifiers, they reported that: 1) acid products significantly increase growth rate of pigs, on average more than 12.0% and 6.0% for 0-2 and 0-4 week post-weaning periods, respectively; 2) the addition of acids to the diet also improves the performance of growing (3.5%) and finishing pigs (2.7%), and 3) under stressful or disease conditions, acids appear to be an effective measure to reduce scouring rate and mortality and to sustain a good growth performance (Tung and Pettigrew, 2006).

## **HIGH LEVELS OF ZINC AND COPPER**

Dietary copper levels of 5 to 10 ppm and zinc levels of 50 to 125 ppm are generally enough to meet the pig's nutrient requirement. However, in the nursery stages, when fed at high concentrations (100 to 250 ppm for copper and 2000 to 3000 ppm for zinc), these two minerals are known to exert positive influences on growth rate (Hill and Spears, 2001). While the exact mode of action for the responses are unclear, they may contribute to antibiotic like activities (Dupont et al., 1994). Long term environmental limitations may prevent high levels from being fed, but currently the use of high Zn (nursery) and Cu (nursery and finishing) is commonly practiced.

## **MEDIUM CHAIN FATTY ACIDS**

Medium chain fatty acids research evaluating the potential antibacterial properties is quite extensive, primarily to control Salmonella within poultry. More recently, they have been shown to be potent antiviral compounds reducing the quantity of detectable viral genetic material and reducing infectivity (Cochrane et al., 2017; Cochrane et al., 2016). A number of potential mechanisms may be involved, such as reduction of bacterial contamination within feed prior to ingestion, modification of gut bacterial populations,

and reduction of environmental bacterial loads leading to increased piglet health. Fatty acids consisting of chains between 6 and 12 carbon atoms long are considered medium chain fatty acids.

In addition to antibacterial and antiviral properties, the use of medium chain fatty acids also has been evaluated as a nursery pig growth promoting feed additive. Thomson et al. (2018) fed a combination of hexanoic (C6), octanoic (C8), and decanoic (C10) acids as well as each individually in nursery diets. They found significant improvement in growth when nursery pigs were fed the combination of all three or when individual C8, C8 or C10 were fed in nursery pig diets. Currently, single medium chain fatty acids are not commercially marketed. However, commercially available feed additive products do contain various medium chain fatty acids, but their concentration level and type are often unknown to producers.

## **RESEARCH DESIGN FOR TESTING FEED ADDITIVES**

Since most feed additives, when beneficial, give a modest response in the 1-3% range for growth, adequate replication is required. Most often, 10 to 20+ replications of each treatment are required to determine a statistical significant effect. Thus the ingredients used, ingredient interactions, weight range, use of appropriate control diets or use of factorials are all considerations when properly designing an experiment for feed additives. Also, the use of commercial barns, which have a higher number of pigs per pen, often allow for a decrease in variation allowing greater sensitivity in determining and more confidently reporting the results.

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**FAMILY & FARM & STAFF: A TRADITIONAL YET UNIQUE WORK ENVIRONMENT**  
AND  
**BUILDING YOUR TEAM: ATTRACTING AND RETAINING PEOPLE**

Written By: **Marianne Hawkins**  
**CEO & Management Consultant, Plainview Consulting**  
**145 1<sup>st</sup> Avenue N.E., Swift Current, SK S9H 2B1**  
[reachus@plainviewconsulting.ca](mailto:reachus@plainviewconsulting.ca)

Co-Presenter: **Dan Hawkins**  
**Senior Marketing Advisor, FarmLink Marketing Solutions**  
[dan.hawkins@farmlinksolutions.ca](mailto:dan.hawkins@farmlinksolutions.ca)

**ABSTRACT**

Farmers, of all types of operations, are part of the noblest of professions: feeding the world, raising animals, and working in concert with natural resources – air, water, and soil – all the while living and working amongst it all. More often than not, you literally live at your workplace, work with your immediate family, and invite employees into your lives and home environment. Is there any other more intimate workplace with little separation between work and the rest of life?

It is no wonder that the stakes are high in family and employee relations when it comes to the farm! The safety of people, animals, land, equipment; the realities of the cycles of life and death – be it of animals or plants; and business and employee succession planning are all very real topics of farm management.

There are many processes and tools that you can use as you practise human resources leadership. We will touch on a few of them with a twist. In our main session, we will outline some concepts that may broaden your perspective on and approach to the stewardship of your farm relationships. In the workshop, we will delve into attracting, selecting, onboarding, and retaining people to your farm regardless of whether they are family or someone else's family.

**INTRODUCTION**

All working relationships encounter the concept of contracts. At the top level, it is important to have at least some legal matters written in an enforceable manner. There is also great value in delving into other contracts and establishing a meeting of the minds. Most workplaces draw a line of separation between the employee and his/her home life; and the employer and its work environment and expectations. However, a farm operation adds further relationship and rural elements to the typical workplace contracts. In addition to a workplace code of conduct, a family-based farm also has a rural community culture and one or more sets of family values and norms to overlay on the workplace environment. The best course of action in dealing with all of these sets of expectations is, of course, frequent, constructive, sincere, open, honest, and mutually-beneficial communication.



Farm challenges and stressors are many; farming is a high stakes, capital intensive, long-term commitment. Our most successful and happy clients have found their way to deal with two major types of farm management decisions. No.1: disciplined management of cost of production (COP) factors to manage profitability and to ensure the future viability of the farm operation. No.2: having the best team the farm can secure empowered to do the best work they can in a positive work environment. We are going to explore the latter and share some of what we have learned about being the type of leader to whom people are attracted to and loyal.

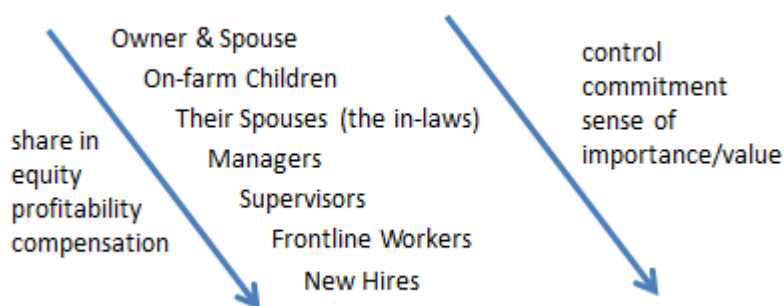
## STEWARDSHIP OF YOUR FARM RELATIONSHIPS

### Be Conscious of Your Ownership Hierarchy and the Power of its Impacts

In a family business, there are usually several classes of citizens separated by ownership, money, and affiliation. We get that it is difficult for owners to divulge (e.g. common, preferred shares) or share ownership (e.g. joint ventures) based on risk aversion such as fears of risking the loss of the farm or of ownership equity. For example, some owners withhold the transfer of equity to the next generation for fears of divorce. Hence, a second class participant in the enterprise is created. Typically, the son(s) or daughter(s) active in the business are working, not owning the farm. If you are unwilling to share equity, then the next option that you can offer is a stake in the profitability or a bonus, followed by offering increases to total compensation (e.g. salary/wages, benefits).

However, as a lack of a stake in the business increases so does the probability of resentment, stress, and familial displacement. As a result, in an extreme case, the family business owners trade the protection of financial assets at the risk of ruling from the grave, isolationism (the only unconditional love left being from babies and pets), and the opportunity cost of the growth of their business and the joy that could have been shared with the various classes of participants in their enterprise. In other words, consider what a) sharing equity, b) distributing profitability, and c) increasing total compensation could provide in terms of increased productivity and of everyone's happiness in the business as a result of closer, stronger relationships.

### Potential Causal Linkage between Farm Financial Structure and On-Farm Relationships



## **Nurture Your Relationships When You are not prepared to Let Go of (Part of) the Farm**

As a family business owner, you can mitigate the above realities by opening up participation and dialogue about the affairs of the enterprise, and with positive employee relations, engagement, and empowerment.

## **ATTRACTING PEOPLE**

### **Be In a State of Constant Matchmaking**

The hiring of an employee should commence well before there is a vacant or incremental position available. Before you create or revise your job description, job posting, employee or other manuals, start by considering your farm goals, metrics, as well as your overall people strategy. Begin with the end state in mind by examining your current culture, level of supervisory training, employee value proposition, and determine any gaps in your current organization that you may need to fill while also doing a job analysis. Once you can describe the potential candidate in terms of key competencies that they would possess to be successful in the role and at your workplace, then the mechanics of the recruitment process should be easier to complete.

There are two ways to ‘always be recruiting’. One way is to continually improve your HR-related processes, policies and procedures. For instance, consider the employee manual as a live document that should be accurate to how your company works, or else revise it to match what you say to what you do. Have a continuous improvement approach to all aspects of your operations. Secondly, keep an eye open for talent. Start internally by working on developing your understanding of your current employees’ goals and how you can work with them to help them become even more valuable and engaged employees. Your staff may also be one of your best sources of referrals. Keep an eye open to your potential employee pipeline. It may be the person you meet at a grocery store or a referral from someone in your network.

### **Embrace the Law of Attraction**

Consider the ‘Law of Attraction’ in terms of a science of attracting more of what you want in terms of talent. Does your job ad blend in and read like most other farm labourer want ads? How are you telling your story and personalizing your farm’s culture, working environment, and values? Compel the applicant to consider your farm opportunity and to explore the win-win relationship that could exist.

### **Evaluate Your Brand and Your Online Presence**

The physical layout and state of your farm, your reputation, your personal and farm presence on the internet – these are components of your farm image and identity, and can become a competitive advantage when attracting applicants and creating loyalty to your farm. A good brand consistently delivers on its product and/or service promise. Can you describe your brand and what sets you apart?

## SELECTING PEOPLE

### Understand the Importance of the Psychological Contract (PC)

This type of contract is the unwritten perception or promises arising out of communications and actions between employees and employers representatives (e.g. recruiters, supervisors, owners). It can be formed and changed starting with the recruitment and selection period, and it lasts the entirety of the working relationship.

Psychological contracts can stem from:

- Verbal conversations (job interviews and offers, conversations with former or current employees, orientation and onboarding sessions, company meetings)
- Written information (company website, job application form, employee manual, mission and value statements)
- Behaviours and actions (how company representatives behave during the interview process; observing how managers and employees act around and treat each other).

PCs are subjective expectations, and not objective facts; however, people feel like their psychological contract is real as it is based on their own beliefs and perceptions. The employment relationship creates obligations and reciprocity that are unique and in the eye of the beholder – be it the employee, family staff member, or owner.

So, employers are well advised to have consistent and clear communication based on the current reality of your workplace (e.g. don't overpromise, only say what you will do, keep company materials current). A breach (minor, short-term) or a violation (more serious, long-term) of a PC can lead to employee demotivation, underperformance, a rise in absenteeism, a perceived decline in support of the employee by the company, or even employee turnover. A good way for employers to manage the PC is to talk about it or put in writing the mutual expectations that the employee and the employer have of each other. Because this contract is constantly changing, it is important for both parties involved to regularly communicate mutual expectations of each other such as at the beginning of employment or of an interim employee review. The PC should be based on your code of conduct and be in line with your farm's values and philosophy so that it is congruent with your culture and goals.

As an illustrative example, a job applicant may hear a recruiter describe how the company provides many benefits such as a productivity bonus system and employee get-togethers such as a company BBQ. When the new hire starts work, they find out that the bonus system only applies to employees who are employed for over a year, and that the company used to have a summer BBQ, but has not in the past two years. In this case, the employee will feel misled and experience a break in the psychological contract that they had formed during the interview process.

More importantly, an employee may feel that they trust the company and are committed to it as they expect that a job well done will result in recognition. In this example, the employee completes a project on-time and expects some recognition of it by their supervisor. If their good work goes unnoticed, then the employee's expectation of a

reciprocal 'good job' can result in a psychological breach and leave the employee feeling less satisfied with their job.

## **ONBOARDING PEOPLE**

### **Learn Why Onboarding is Different than Orientation and Training**

Most organizations do an okay job of employee orientation. An employee's orientation will likely include filling out paperwork, completing some mandatory training, being introduced to their supervisor and immediate team, having a facility tour, and getting assigned their locker or workstation. Often, formal or on-the-job training are also condensed into a short time period and ignore some basic rules of how much information a person can retain or of adult learning principles.

In contrast, onboarding is the concept of integrating a new employee into an organization and its culture, also known as organizational socialization. Many employers don't recognize or value the long-term ROI of getting an employee off to a great start. Much like the PC, onboarding starts during pre-employment encounters and lasts at least the first year, if not longer in a progressive, changing work culture, or as employees change roles or locations. Common definitions of onboarding describe the process of assisting new employees to become adjusted to the social and performance aspects of their new jobs quickly and smoothly rather than the sink or swim approach. It is about helping an employee learn the knowledge, skills, attitudes, behaviours, norms, and expectations of them that are most likely to help them function effectively in their role.

### **Utilize the Power of the First Day and of Onboarding**

Regardless of the size or type of employer, we all know that people want to feel special and valued. The power of the employee's first impression, first day, and first month in terms of making them feel welcome, forging workplace relationships, preparing them for success in their role, clarifying expectations, and providing support and coaching is enormous. It can result in increased job satisfaction, performance, the likelihood that they will stay, and the faster they can contribute to the organization's mission and goals.

We strongly urge you to consider the valuable investment of time that onboarding can provide. What do you want your employee to say about their first day? 'I am so drained. All they had me do all day is fill out paperwork, sit in front of a computer doing courses, and I don't even remember the names of the people I met on the farm tour.' Or 'It was great! The owners greeted me after I stepped out of my vehicle, introduced me to their family, and took me out for lunch today. I met the crew, got a clean locker with my company coveralls and other stuff already in it, and they started to train me and show me how I could pass my probationary period and earn my first raise.'

## **RETAINING PEOPLE**

### **Create a Psychologically Safe Climate**

People need to know how you are going to react before you react. In psychologically safe workplaces, employees feel safe taking risks and speaking up without fear of negative

consequences or wondering which boss is going to show up today, or what mood the boss is in. It is also important in building a great team; one where members feel they can share suggestions, ideas, concerns, mistakes, solutions, and lend one another support.

### **Learn How to Have Productive Conflict**

Conflict is a part of life. As a leader or supervisor in the workplace, one should not fear conflict, but rather embrace it as it is your job to do so. Your ability to recognize conflict, get to the root cause of it, and work to swiftly address it and bring resolution to a situation is instrumental to your leadership and to the health of the organization. Having said that, employees also need to be able to work out their own conflicts amongst each other, or at least find a way to work together effectively and not to the detriment of safety, culture, or impacts to the farm. Hone your ability to deal with your own conflicts and guide others to do the same.

The only person that you can control is yourself – your thoughts, your actions, and your reactions. Often when somebody says something we find hurtful, uncomfortable, or even just rude, our thoughts turn to what was the intent of the other person. Why did they say that? What do they mean by that? What are they thinking about me? Turn your thoughts away from reflecting on the intent of the other person and ask yourself, ‘How are this person’s words or actions affecting me?’ This shifts the dynamic from what someone else is doing, which you have no control over, to how this is affecting you, which you do have control over.

Now that you are focused on how someone else’s words or actions are affecting you, there are three choices according to *Crucial Conversations* (Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler):

- 1) Avoid it and move on,
- 2) Listen to these feelings and handle it poorly, or
- 3) Handle it well.

Conflict usually catches us off guard, which initiates our fight or flight instinct or some other physical manifestation.

The acronym *Crucial Conversations* uses is STATE. Start with your observations. This can be as simple as repeating back the words someone has said that made you uncomfortable. Tell your story. Here is where you tell the other person how their words or actions make you feel. Ask for their story. Give them a chance to explain themselves and what they were thinking. Talk tentatively. Your word choices shouldn’t be definitive if you are trying to have a conversation and learn more about each other. Encourage testing of your new understanding. Agree with parts of their story that you can agree with so that they understand that your motives are genuine.

Having said this, don’t get caught up in overinvesting your time dealing with issues arising from the bottom 10-25% of your workforce. Document employee matters, use progressive discipline and coaching to assist any below average employees, and terminate the employee relationship if need be. In order to avoid feeling hamstrung by

an employee, it is important to have shared knowledge amongst the team, written operating procedures and manuals to capture the know-how and business intelligence that you have amassed over the decades, and always be recruiting.

### **Develop an Employee Experience**

Some employers have looked to their efforts in creating a customer experience and adopted these techniques to frame an employee experience approach. Consider using a brainstorming session to explore employee needs, wants, likes, and dislikes. Put together a focus group of employees to review operating procedures and propose process or technology improvements. Although exit interviews may provide valuable feedback, consider having 'stay interviews'. Instead of annual performance reviews, consider an ongoing feedback system after the end of each season or special assignment. Have a separate, forward looking meeting with an employee to discuss their interests in personal or professional development, cross-training, learning opportunities, additional or new responsibilities, and what motivates them to do a good job.

As an individual employee and as a team, employees appreciate knowing where they stand and what is expected of them; clear expectations leads to good employee performance and high performing teams. Employees want to be held accountable to realistic, understandable, agreed to, and written expectations and job descriptions so that they know what constitutes success in their work. Teams appreciate having the opportunity to provide feedback, add value, and contribute to the decision-making process. Have regular, specific meetings with staff to share information, provide status updates, review daily work priorities, or to do a post-mortem on a problem that occurred. Encouraging feedback from employees will make them feel more valued and happier at work, and also leads them to be safer at work.

### **Use Employee Recognition, Motivation, and Empowerment to Fuel Engagement**

People are motivated differently, and so it is important to speak to each employee separately to discover what matters to them. Gone are the days of employee of the month or standard service awards for years of service. Consider realigning your rewards to be individualized to the employee. One employee may prefer a lifestyle benefit such as an afternoon off work with pay for a superb job done. Another employee may value certain activities such as tickets to a game or the opportunity to attend a conference. It is important to get to know your employees and treat them like your extended (work) family. The information and observations that you gather will allow you to customize your rewards and recognition, and it will motivate them because you took the time to get to know them better.

Having said that, most employees do share the No.1 reason that people are motivated to stay or leave a company. People work for people and people quit because of people. In other words, 'people leave managers, not companies.' Be aware that if your manager says one off-putting thing to the subordinate, then the employee's motivation may be reduced for a period of time.

On the other hand, a manager can empower an employee to have autonomy to make certain decisions on their own. Autonomy gives the employee a sense of ownership, pride in their work, and encourages self-motivation to grow in their role, and do the best job possible. Likewise, employees feel empowered when their work has meaning, purpose, and is contributing to the greater goals of the organization.

## **CONCLUSIONS**

- So many people leadership principles are common sense, but the question is: Are you practising them? Close the gap between what you know and what you do. Help the employee be successful and bring the most value to your farm through a great onboarding experience. Acknowledge and appreciate your employees consistently for their achievements and create a culture of recognition that will make it many times more probable that the employee will stay.
- People are human and subject to change. Do you know what they want (personalized recognition)? Do you know what they expect (psychological contract)? Do you appeal to them (your farm brand, your leadership)?
- Always be recruiting. Share your farm story and compel employees to embrace and share in your farm culture. Create an employee experience that motivates employees to stay and give their best efforts.
- Create a safe workplace environment where employees are expected to participate with their team and voice their concerns in a constructive manner. Encourage feedback and provide it daily to employees so they understand where they are in missing, meeting, or exceeding your expectations of them.
- Increase the employee's sense of commitment, loyalty, and of value and importance by sharing farm goals and decisions, by creating autonomy in how they do their job, and by empowering the employee to develop and grow with the organization.
- The additional expectations and complexities of farm family/employee relationships make it all the more important for farm owners/managers to understand, communicate with, motivate, and lead people well.

Best wishes for a healthy family! We hope that we have provided some additional tools or insights into how you can constructively approach your family, your farm management, and your employees. We wish you many seasons of functional and successful people relations as you support your family, maintain your farm's viability, and engage and empower your staff.

## **ACKNOWLEDGEMENTS**

First, thank you to all of our combined clients over the years who have invited us into your businesses and to meet at your kitchen tables. You have contributed to our views of success and how best to achieve it despite many challenges.

We also wish to acknowledge and thank Bev DeVries, London Swine Conference (LSC), who reached out to Liz Robertson, Canadian Association of Farm Advisors (CAFA). Without Liz's referral to Bev, and Bev's work with the LSC speaker selection process, we would not be here presenting at LSC.





# **Day 1: Workshop Sessions**

## SO YOU'VE HAD A BAD DAY?

**Teresa Van Raay, Van Raay Farms Ltd.**

**Nick Huybers, Huybers Hog Haven Ltd.**

**Frank Wood, Ontario Pork**

Martin and Teresa Van Raay have been pig farming for 36 years. They were farrow-to-finish producers until 2009 when they converted the sow barn. They grow soybeans, corn and wheat. In 2014, they began growing garlic. In 2010, the Van Raays started a company called The Whole Pig. They sell their pork at their farm store as well as through delivery. The couple has four children, Jessica, Stephanie, Dean and Phil. Phil started farming in 2011 mainly working with the pigs. Dean changed careers in 2014 and came back to Dashwood working with a garlic focus.



The Van Raays enjoy being involved with their community and industry. Teresa has been an Ontario Pork Board Director for 12 years, is a graduate of the Advanced Agricultural Leadership Program, Class 9, a member of the local Chamber of Commerce, and is active in her church choir. Phil is a graduate of the police studies program from Georgian College, a participant in the Ontario Pork Leadership program and a volunteer firefighter with the Dashwood Fire Department.

On October 31<sup>st</sup>, 2016 at 5:30 a.m., shortly after finishing the corn harvest and filling their silo, the silo collapsed and landed on the feed room of their finishing barn. This is their story and lessons learned.



Mike and Lillis Huybers have been farming since the early 1980s, having started and built the farrow-to-finish land-based hog operation Huybers Hog Haven Ltd. They grow corn, beans and wheat. They are proud members of Conestoga Meat Packers and have been involved with the organization since the beginning.



Mike and Lillis have four children. Nick is the oldest and has been farming with them since 2013 after completing his agribusiness degree at Olds College. Alyssa, the second oldest, is an operating room nurse. Their third child, Ellyne, went to Fanshawe College and studied business insurance. She started working with Huybers Hog Haven Ltd. in 2017 doing office administration. Janelle, the youngest, is finishing up her Foods and Nutrition undergrad with Western University. She is moving on to do an internship next year and hopes to become a dietitian.

On the morning of January 31, 2017, the 4,000 head finishing barn started on fire. In less than two hours the entire barn was gone. What began as a routine and peaceful day quickly turned into an unimaginable ordeal.



## **RESOURCES THAT CAN HELP IF YOU'RE "HAVING A BAD DAY":**

### **On-Farm Emergency Planning Guide**

Ontario Pork created an On-Farm Emergency Planning Guide, designed to help farmers and their employees plan for and manage emergencies that could potentially occur on farm. The binders include everything you need to create your individualized emergency response plan, including an electronic version with fillable forms.

Copies of the emergency binder are available by contacting Ontario Pork: (519) 767-4600 or [memberservices@ontariopork.on.ca](mailto:memberservices@ontariopork.on.ca).

### **Ontario's mental health resources**

Ontario Pork and OPIC have compiled a list of free mental health and addiction services in your community. While not specific to agriculture or swine production, free, confidential support is available to Ontario residents dealing with stress, depression, anxiety, addiction and other mental health issues.

An electronic version of the pocket-sized brochure is available in the list of quick links at the bottom of [Ontario Pork's homepage](#).



## **MEDICATION – A GLOBAL PERSPECTIVE OF THE CHANGING RULES**

**George Charbonneau**

**Associate Veterinarian, South West Ontario Veterinary Services**

**500 Wright Blvd, Stratford, Ontario, N4Z 1H3**

[gcharbonneau@southwestvets.ca](mailto:gcharbonneau@southwestvets.ca)

### **ABSTRACT**

The issue of Antimicrobial Resistance (AMR) has been around for many years. The development of AMR has been dealt with in different ways in different jurisdictions. In most of the developed world there is an increasing sense of urgency to find a solution to the problem of preserving the efficacy of these important tools in treating human and animal disease. Within the developed nations there is a wide disparity in the way that the problem has been addressed. Within the developing nations, this issue is barely hitting the “radar screen” of public concern. Even in the developing nations, however, the level of awareness of the issue is beginning to increase.

### **ANTIMICROBIAL USE IN FOOD ANIMALS AND HUMAN HEALTH RISKS**

Dr. Peter Davies, from the University of Minnesota, has presented some very thoughtful arguments about how we should respond to the question of the risks presented using antimicrobials in food animals. It can be argued that antimicrobial use in any setting will present an opportunity for the development of antimicrobial resistance. The contribution of antimicrobial usage in food animals to the development of antimicrobial resistance in human pathogens is not fully understood but it is not zero. Greater abuse in other regions or in humans is not an argument for tolerating the ‘injudicious’ use of antimicrobials in food animals. Lack of absolute proof of harm from the use of antimicrobials in food animals is, therefore, not an excuse for the injudicious use of antimicrobials. Even with all the questions about the human risk set aside it is still important to recognize that we need to preserve the usefulness of antimicrobials in food animals. There is, therefore, room for improved stewardship of antimicrobials in food animal production.

### **TREATMENT VS GROWTH PROMOTION**

Treatment of sick animals involves the administration of antimicrobials to a specific sick animal. The use of antimicrobials in food animals as a treatment in the sick animal is almost universally accepted as a reasonable practice and this usage is relatively easily defended. Understanding the meaning of treatment, control and prevention on label claims on approved label claims is key to understanding how antimicrobials may be used.

Control or metaphylactic treatment occurs in populations of pigs where some of the pigs are clinically sick while other pigs are still healthy. Most would agree that there is value in mass medication that includes the healthy “at risk” animals even though some of those pigs may not have gotten sick when treatment is initiated. Treatment via mass

medication is more easily facilitated. There is a welfare benefit when at risk animals can avoid the discomfort of becoming sick. This practice is somewhat less easily defended.

Preventive or prophylactic treatment occurs in populations that currently have no sick pigs. Preventive treatment is usually recommended when it is known that animals are likely to get sick. This could be based on a certain percentage of previous batches having become ill. The pigs may have been stressed. It is obviously difficult to predict the future. Some batches may be treated when, in reality, they were not actually going to get sick. The downside of waiting for the first few pigs to become sick before using a preventive treatment is that the treatment in the face of an outbreak may be less effective than the pre-emptive preventive treatment. More animals will suffer needlessly. Preventive treatment can be more difficult to defend and is currently one of the more contentious issues with respect to antimicrobial usage.

Growth promotion is the use of antimicrobials to improve growth, carcass merit or feed efficiency. Although it could be argued that the evidence of harm was not well supported on a scientific basis this practice was not easily defended as being a necessary use. In the final analysis, there was limited push back from the food animal industry to eliminating growth promotion claims for antimicrobials.

## **PRUDENT USE VS STEWARDSHIP**

Some are of the mind that prudent or judicious use is a sufficient response to the issue of stewardship of antimicrobials. Prudent or judicious use involves the use of antimicrobials in a setting where the diagnosis is sufficiently established such that the correct antimicrobial is prescribed for the bacterial agent that is causing the disease. This is more commonly stated as choosing “right drug for the right bug”. If we believe the previous statement that says that all AMU, including prudent use, presents a risk for AMR then we must acknowledge that even prudent use presents an antimicrobial stewardship challenge. Prudent use should reduce antimicrobial usage in that animals are not treated with inappropriate antimicrobials which require a subsequent treatment with the correct antimicrobial.

Stewardship of antimicrobials includes the principles of prudent use but the goal of antimicrobial stewardship includes additional measures that preserve the usefulness of antimicrobials as a tool for the future. Even if all antimicrobial use was prudent we would still be challenged to further reduce antimicrobial usage as part of a stewardship effort.

## **THE EUROPEAN APPROACH TO AMR AND AMU REDUCTION**

The countries of the European Union have approached the challenge of AMU reduction primarily through legislation and regulation. One of the first steps was to ban the use of medically important antimicrobials for growth promotion. Initially, the elimination of the use of antimicrobials as growth promoters had the unintended consequence of allowing subclinical disease to be replaced by outbreaks of clinical disease. This meant that initially there was no measurable overall antimicrobial use reduction. The growth promotion usage was replaced by disease treatment usage. Eventually these countries

worked out the best management practices that have been implemented in order to reduce AMU and some very significant reductions have been achieved.

## **THE UNITED STATES APPROACH TO AMR AND AMU REDUCTION**

Antimicrobial resistance has been a concern in North America since antimicrobials were discovered. Until recently the approach to reduction of AMU has taken a very different approach than the European experience. Activists with various agendas have approached food retailers and demanded changes in their purchasing habits. The antibiotic free programs were a response to these market pressures.

### **Influencing the AMU Reduction Agenda In The USA**

**Lobbying Organizations.** As of 2009, the regulatory landscape began to change in the United States. Organizations such as the PEW Charitable Trusts and the Infectious Disease Society of America had been proposing increased restrictions for the use of antimicrobials in food animals. The initial efforts in North America were focused on food retailers, legislators and regulators.

**Legislators.** In the US Senate, Senator Dianne Feinstein, D- Ca has almost perennially brought forward legislation that would further restrict the use of antimicrobials in food animals. The latest version is of this legislation is S.629 Prevention of Antibiotic Resistance Act or Fifteenth Congress Bill S.629 (2017-2018). One of the goals of this bill would be to have the Food and Drug Administration (FDA) “withdraw its approval of medically-important antibiotics used for disease prevention or control”.

In the US House of Representatives, Representative Louise Slaughter, D-N.Y. has also proposed legislation that would restrict the use of antimicrobials. The latest version is H.R.1587 - Preservation of Antibiotics for Medical Treatment Act of 2017 or (PAMTA). The preamble to this proposed legislation suggests that “companies use antibiotics as a preventative measure rather than improving conditions.” Most of these bills are not expected to be passed but they do set the agenda in a very public way.

**Executive Branch.** President Barack Obama initiated several actions with respect to AMR. This included The National Action Plan for Combating Antibiotic-Resistant Bacteria in 2015. The Obama Administration also started the Interagency Task Force for Combating Antibiotic-Resistant Bacteria or (CARB). This constituted a multi-departmental coordination of activities as well as collaboration with other countries. If you ate at the Obama White House you would be consuming raised without antibiotic meat.

President Donald Trump actually began his tenure by proposing to slash spending on health care in general. What ended up happening however was that Congress provided a \$50 million increase to Combat Antibiotic-Resistant Bacteria. The monies were to be used to improve disease diagnostic technology, find alternatives to antimicrobials. The Executive branch is ultimately responsible for the running of the various departments that establish and administer regulations that affect AMR and AMU.



## **Implementing the AMU Reduction Agenda In the USA**

The Department of Human Health Services is an overarching department that includes many agencies that are involved with antimicrobial use reduction

**Centers for Disease Control (CDC).** The CDC and the National Antimicrobial Resistance Monitoring System (NARMS) provide feedback on the frequency of human infections with bacterial pathogens and the frequency and type of antimicrobial resistance. The CDC presents evidence for the human cost of antimicrobial resistance.

**Food and Drug Administration (FDA).** The FDA began to plan for changes to the oversight of antimicrobials as early as 2008. The Animal Drug User Fee Amendments of 2008 (ADUFA Section 105) required drug sponsors to report AMU sold or distributed by species (cattle, swine, chickens, and turkeys). The FDA is required to publish its annual summary report on annual antimicrobial usage by December 31 of the following year. The first report will be due in December, 2018.

The Guidance for Industry 209 / 213 became effective on January 1 2017 for all Guidance 152 antimicrobials (medically important antimicrobials). All growth claims were removed, and preventive or therapeutic claims added. The use of these products now requires the oversight of a licensed veterinarian for feed and water medications, but not injectable medications. These medications are no longer available “over the counter”.

The Veterinary Feed Directive (VFD) became effective as of January 1, 2017 for all Guidance 152 antimicrobials. The VFD became the mechanism for veterinary oversight of antimicrobial use. Veterinary oversight requires a valid Vet Client Patient Relationship for the authorization of prudent antimicrobial usage.

The Center for Veterinary Medicine is responsible for VFD compliance and they are beginning this effort in education mode. It should be noted that bending the rules on label claims is not just frowned upon in the USA. It is illegal. The CVM can announce that in certain situations that they will announce certain uses that they will or will not enforce. Snap inspections are used for enforcement.

The Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA) is still in place. In 1997 there was a prohibition on extra label use of Floroquinolones. In 2012, extra-label use of Cephalosporins in cattle, swine, chickens, and turkeys was prohibited and that includes usage at unapproved dose levels, frequencies, durations, or routes of administration, products not approved for that species and using cephalosporin drugs for disease prevention.

Antimicrobial Usage Measurement options are being investigated in an FDA funded project which is evaluating the feasibility of capturing and analyzing data that is already currently available within the industry. The objective is to avoid duplication of record keeping. The current goal is to avoid setting arbitrary reduction goals and to try to use the AMU data to improve how we can use antimicrobials more effectively and preserve their usefulness.

## THE DEVELOPING NATIONS APPROACH TO AMR AND AMU REDUCTION

Antimicrobial usage reduction has not yet hit the radar screen in a major way in the developing nations. This would not be unexpected in nations that are challenged in their ability to provide widespread access to high quality animal protein. When water and food security are the most important agenda items it is difficult to focus much attention on the antimicrobial resistance issues. As developing nations increase their wealth generation the citizens have and will increasingly ask more questions about food safety and antimicrobial resistance. It goes without saying that the developed nations are keenly interested in seeing the developing nations adopt policies that will preserve the usefulness of antimicrobials. In today's global society it has become much easier to move antimicrobial resistant pathogens from one area of the world to another. This effort will in some ways be dependent on the weakest links. The World Health Organization and Food and Agriculture Organization continue to increase awareness of the importance of this issue in the developing nations.

## ANTIMICROBIAL RESISTANCE ISSUES IN THE NEWS

There are many stories that are unfolding with respect to positioning of organizations and nations in the antimicrobial resistance and antimicrobial usage reduction effort.

### Does The Use Of Antimicrobials Put Human Health At Risk

**Sow Herd Antimicrobial Use Affects Resistance at Slaughter.** Danish researchers found a significant positive correlation between the levels of AMR genes in finishers and the sows in the farms where the pigs were born for some of the genes (ermB ( $p=0.47$ ,  $p$ -value=0.002), ermF ( $p=0.41$ ,  $p$ -value=0.03), and tet(O) ( $p=0.33$ ,  $p$ -value=0.04)).

Chinese researchers wanted to better understand the dynamics of tetracycline-resistant bacteria and tetracycline resistance genes in bulk and rhizosphere soils when pig manure was added to soil that was used for growing plants for human consumption. The researchers found that there were significant differences in the relative abundances of tetracycline resistance genes between bulk and cucumber rhizosphere soils, suggesting that the use of pig manure exerted a more lasting impact on the spread of tetracycline resistant genes in the rhizosphere than in the bulk soil. This research further highlights the possible connections between the use of antimicrobials in animals and the potential for indirect exposure of humans to these antimicrobial resistance genes via the environment.

Canadian Researchers found that addition of various types of organic amendments to soils including swine manure compost has the potential to increase the abundance of antibiotic resistance genes in the soil bacteria. Furthermore, certain bacteria such as *Clostridium* that are carrying these antibiotic resistant genes will persist for many years under field conditions following the application of swine manure compost.

US researchers found that all analytes were detected in tile drain effluent, confirming tile drainage as a pathway for antibiotic transport. Their results identify the episodic

occurrence of antibiotics, and highlights the importance identifying seasonal fate and occurrence of these analytes.

US researchers found Salmonella 4,[5],12:i:- currently circulating in swine in the U.S. Midwest are likely part of an emerging multidrug resistant clade first reported in Europe, and can carry plasmid-mediated resistance genes that may be transmitted horizontally to other bacteria and thus could represent a public-health concern.

US researchers found that exposure to pigs did not lead to prolonged colonization in most subjects, and the higher numbers of *S. aureus* in PC subjects suggests that unknown host factors may determine the likelihood of prolonged colonization by *S. aureus* of livestock origin. People in contact with livestock can carry pathogens out the barn.

In Britain issues swirl about preventative medication. It said the need for 'targeted prophylaxis', preventative medication in the short to medium term in response to specific disease challenges, will remain to protect the health and welfare of pigs – particularly where no vaccines are available or producers faced persistent problems 'that prove intractable to non-antibiotic interventions'. However, habitual or routine prophylaxis (a 'just in case' approach) 'should be rapidly phased out'. But metaphylaxis, the treatment of whole groups of pigs once disease has occurred in some of that cohort, will remain 'a fundamental requirement to ensure health and welfare in pig populations'. The British pork supply industry has implemented volunteer electronic recording of on-farm antibiotic use. They have demonstrated a 34% reduction in antibiotic use in just one year and committed to an overall reduction of 60% by 2020.

In 2016, the total antimicrobial consumption (in kilos) by Danish animals was approximately 5 per cent lower than the previous year. It is the third consecutive year that a decrease has been recorded. Consumption has decreased in pigs, cattle, poultry and fish. Overall, the veterinary antimicrobial consumption has decreased approximately 10 per cent from 2013 to 2016, which is equivalent to a reduction of 12 tonnes of antimicrobials.

Danish Enteric infectious disease in weaner piglets, including postweaning diarrhea (PWD), are usually treated and/or prevented with antibiotics and/or zinc oxide in the piglet feed. However extensive use of antibiotics and zinc oxide in intensive animal production is unwanted as it may promote microbial antibiotic resistance and pose environmental problems.

In Germany, the increase of the multi-resistant *E. coli* populations seems to be linked with persistence of the resistant population, caused by the influence of high dietary zinc feeding. These findings corroborate previous reports linking high dietary zinc feeding of piglets with the occurrence of antimicrobial resistant *E. coli* and therefore question the feeding of high dietary zinc oxide as alternative to antimicrobial growth promoters. There is some good news in Germany as The Consumers' Protection and Food Safety Federal Office shows that the amount of antibiotics used in animal medicine has dropped by more than half between 2001 and 2016, going from 1,706 tonnes to 742 tonnes (-56.5%). Between 2015 and 2016, the total amount of antibiotics decreased by 63 tonnes (8%).

Recently, concerned experts of public health have become more outspoken, often criticizing pig farmers for social irresponsibility and gambling with public health. Danish pig farmers are internationally renowned for their relatively low use of antibiotics. Nevertheless, the public criticism aimed at farmers is relatively strong in Denmark. Even when it seems that pork producers have done a world class job of antimicrobial stewardship they can face severe public criticism and stigmatization. The potential for this to cause mental health issues should not be underestimated.

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## REDUCING ANTIBIOTIC USE – ON FARM STRATEGIES

Greg Wideman

South West Ontario Veterinary Services

500 Wright Boulevard, Stratford, ON

[gwideman@southwestvets.ca](mailto:gwideman@southwestvets.ca)

Societal concern over antimicrobial resistance in human pathogens, and the potential factor of antimicrobial use in livestock production, has led Canadian regulators to tighten certain rules around antimicrobial access in 2018. Specifically, antimicrobial use for growth promotion will be disallowed, and all remaining use of antimicrobials will fall under a higher level of veterinary oversight for prescribing and dispensing.

It appears that in spite of different rules around product registration and labelling, prescribing and dispensing, the availability of antimicrobials to the producer will be essentially unchanged. Sick pigs, and pigs that are going to get sick, can still be treated as before. However, the new landscape provides an opportunity for producers and their advisory teams to reflect on antimicrobial use protocols and consider changes, including reduction of antimicrobial use and cost where appropriate.

South West Vets' objective is to equip our clients to raise pigs with the same cost and biological performance, including mortality rate, during this transition to the new regulatory reality. Achieving this goal requires a highly collaborative approach and depends on innovative thinking to tackle some of the typical barriers to success.

**1. Measurement, visualization, review and storage of performance data** is a requirement for producers transitioning to less antibiotic use. Changes to performance could be so significant (especially when going to completely antimicrobial-free) as to jeopardize the sustainability for the farm, if not addressed quickly. Therefore the attributes of a good data management and performance monitoring system include:

- Simple to keep up to date, with minimal or no requirement for duplicate data entry
- Accurate, with logical calculations, and high quality data input
- Web-based, allowing for whole production team and advisory team to review
- Batch or time period closeouts to monitor progress and track changes in performance relative to health program/nutrition/management changes
- Robust inventory tracking to follow 'treated' and 'program' pigs within a single batch or group
- Allow for accurate benchmarking within a system and between systems if appropriate

**2. Elimination, control and prevention of critical diseases** is essential in the process of reducing antimicrobial use in pig production. PRRS virus most obviously drives antibiotic use and infection with PRRS virus is a serious disadvantage or barrier to effectively withdraw antibiotics. Vaccination of growing pig flows mitigates some cost of PRRS but

PRRS elimination, and prevention of subsequent infection, should be “Plan A” for all farms where it is feasible.

*Mycoplasma hyopneumonia* (Mh) elimination is possible and cost effective and is a second strong consideration for antibiotic-reduced production. Elimination of PRRS and Mh from breeding herds can often be accomplished at the same time, which strengthens the economic considerations.

For the many other bacteria and virus which we do not normally consider for elimination from the farm, the most important control technique is clearly effective gilt acclimation. SIV, ‘suis-cide’ bugs, etc. all respond favourably to early, structured, verified gilt acclimation.

The best way to manage a new pathogen is to ensure that it doesn’t ever arrive at the farm! Therefore biosecurity focus needs to be sharpened to make responsible antibiotic use in production sustainable. Any site with a track record of new infections over time should start the conversation about transition to less antibiotics with a conversation about biosecurity.

**3. Sustained management effort, focus and fine-tuning** is a requirement for successful antibiotic-reduced production, and includes, but is not limited to, the following areas of daily management:

- Colostrum management to effectively control early infections
- Fostering protocols to minimize horizontal disease transmission in the farrowing room
- Processing hygiene and efficacy to reduce infections without antibiotic ‘coverage’
- Iron/anemia status monitoring and control to ensure thrifty pigs are weaned
- Wean age optimization
- Transport care and auditing, shipping room and nursery setup to receive weaned pigs
- Individual pig treatment (targets, protocols) to reduce transmission of pathogens and ensure high quality care
- Water quality and treatment to minimize infectious pressure from contaminated water supply or equipment, and to maximize water intake.
- Effective, robust, verified vaccine strategy

All of these focus areas can be routinely audited, observed and reviewed, which prevents slippage and contributes to the sustained management effort required to raise pigs without the usual “Band Aid” of antimicrobials.

**4. The final two ingredients in the transition to less antibiotic use are communication and collaboration.** Results from batch deliveries, finisher closeouts, or harvest events need to be shared back up the system to sow herd managers to fully understand the impact of changes on the system. Regular structured communication feedback and teamwork to resolve new and unexpected issues will prevent productivity or cost problems from going unchallenged for too long in the antibiotic-free farm. One valuable way to collaborate is

to benchmark against similar producers. The Ontario Pork Industry Council's Antimicrobial Use Monitoring Project is an excellent example of producers comparing best practices to achieve lower antimicrobial use and cost of production.

#### **ACKNOWLEDGEMENTS**

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## **TIPS AND TRICKS FROM THE PRODUCERS PERSPECTIVE - RAISED WITHOUT ANTIBIOTICS**

**Tara Terpstra**

**Silver Corners Inc., Huron County Pork Producer**

[terpstradennis@hotmail.com](mailto:terpstradennis@hotmail.com)

### **SUMMARY**

Tara Terpstra and her husband Dennis are pork producers in Huron County that raise antibiotic free pork. In 2015, they constructed a loose sow housed barn that houses 370 sows. They have a state of the art ventilation system and have Schauer/AP electronic feed stations. It was their intentions to raise their livestock to reflect their own personal values and embrace raising swine without antibiotics and use nutraceuticals. Shared is information of their first 12 months of production, the issues they faced raising antibiotic free hogs and tips that have made it possible to remain antibiotic free.

### **Past to Present Pork Production**

Dennis was born and raised in agriculture and Tara was raised in the city. In 2001 they farmed 1300 acres and had a 1000 sow farrow to finish operation. Due to the management structure of the operation, they faced issues with the sow herd immunity and usage of antibiotics in the feed. In 2015, the opportunity presented itself to build on their own, a 370-loose sow housed facility and were able to raise their hogs antibiotic free. They changed their business model from a Reactive to Proactive approach.

### **Family values and Nutraceuticals**

Tara and Dennis have strong family values that come back to the mantra when farming hogs, "If one of our family members should become ill and require antibiotics, do we all go on antibiotics together". This has allowed a greater understanding on individual swine treatment and not blanket antibiotic usage that is water or feed grade. On a personal level, the Terpstra family uses a wide variety of homeopathic medications and vitamin enriched products for their own immunity and health. This made the transition to Nutraceuticals for swine easy and familiar. Other reasons for becoming antibiotic free was the transition that already exists in European countries, the consumer driving niche markets and for economic reasons.

### **New Barn and New Innovation**

In 2015, they built a loosed house facility that has an Airworks Ventilation system. They also are using the Schauer ESF system with RFID tags for the sows. There are limited stalls therefore once a sow has been bred she is returned to one of two loose pens three days after insemination. There is a trainer pen for gilts and they have a training protocol for all new gilts entering the facility. In the farrowing rooms there are Verijken lift decks for all sows. They also installed piglet covers over the hot water heating pads. This allows for the farrowing rooms to be kept cooler.

## **Burlap vs. Stresnil**

When a room is prepared for farrowing, two days before the sow's due date she is introduced to a meter-long piece of burlap. Tara began to use this after an article she received from Scott Walker, GVF. Burlap was used so the sow could nest in an environment that was closer to her natural environment. This has allowed for very limited use of Stresnil. Also, her newborn piglets use the spent burlap as their nest. Many times, piglets can be found laying on the burlap as if it were the natural nest.

## **Sow Protocols – Gestating and Farrowing rooms**

Tara and Dennis take an individual treatment approach to swine medication. They take an early intervention attitude when assessing pigs. In gestation and farrowing, any sow that does not eat their daily feed ration is found, assessed and given treatment based on her individual requirements. Some additional tools to determine the best course of action are temperature taking, behaviour of the sow, colour of her coat, chilled ears, stiffness or gait of the sow, where and how she lays, discharge and stool appearances. Once this is determined a protocol of Nutraceuticals may be given first based on our initial assessment, if serious then an appropriate medication is administered.

## **Piglet Processing**

Piglets are processed between day 3-5, as per the pig code. Piglets are not given any antibiotics at this time. They are given iron with pain medication, vitamins both orally and injectable. They have their tails docked and males are castrated. Our death loss due to surgical problems is less than 0.4%. Care to disinfecting procedures are critical. Extra care is given to scraped cheeks that receive zinc oxide on the wound, scraped knuckles receive hoof fit gel that is high in copper and zinc, and they are then bandaged for three days. Ten days later piglets are given 1cc of iron again for growth, are vaccinated for an E.coli scour and any sores are sprayed with an additional copper/zinc solution. Piglets are also exposed to potato starch to help with natural scours.

## **Weaning Tips**

When piglets are weaned they are given potato starch and bentonite (clay) on their mats to eat to suppress the scour. Garlic for overall health is an additive to their daily feeds and Kelp is also introduced which is high in protein that aids in growth during this stressful time in a piglet's life. There are no antibiotics in piglet feed. Piglets also are exposed to toys to minimize weaning stress.

## **PRRS, K88 E.coli and medicating with antibiotics**

In late winter 2017, a strain of PRRS 1-1-1 and myco entered the sow barn from the air. This affected the sows with some abortions and issues in lack of appetite in both farrowing and gestation. A cough was also present in the entire barn. We remained vigilant on individual treatments for all sows and medicated 25% of our herd over a 6-week period. Most of our struggles were in the farrowing rooms for about 4 weeks. We found that the cough didn't change too much with an antibiotic and we had greater success with an anti-inflammation medication instead. Once the herd was exposed to the

virus the PRRS negative piglet in the first 4 weeks had the greatest struggle for growth. They were only medicated case by case. The PRRS positive piglets that followed the next four weeks grew as expected, they even caught up on the hairy poor doers. Stillbirths increased during this period of time and then the four weeks that followed we documented higher mummified piglets. Overall the PRRS virus affected 12 weeks' worth of production.

In the summer of 2017, K88 E.coli appeared in our hot nursery. There was no way to determine the cause. Some weeks half of the litters would require antibiotics and some weeks only a couple piglets would require antibiotics. We moved to vaccinate the piglets to try to maintain a RWA free piglet after weaning and it has helped considerably. We have also acidified the water to a pH 4 and continuously lay down potato starch and bentonite clay to help the piglet fight their symptoms naturally and continue to strengthen their immune system.

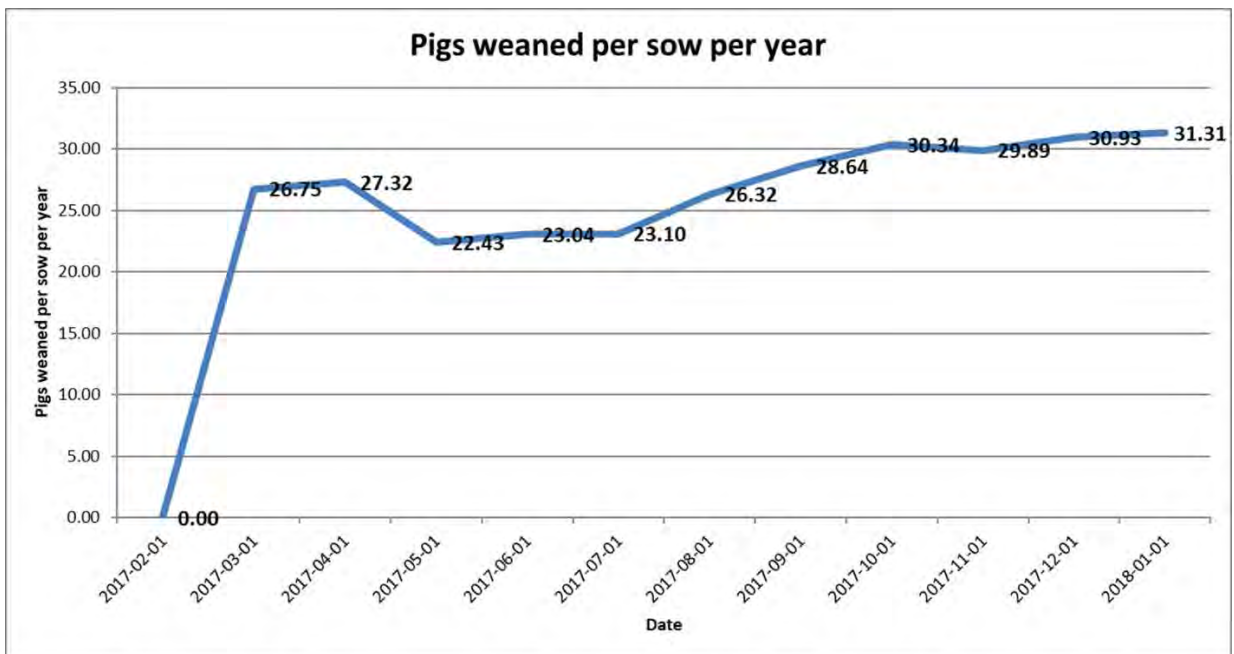
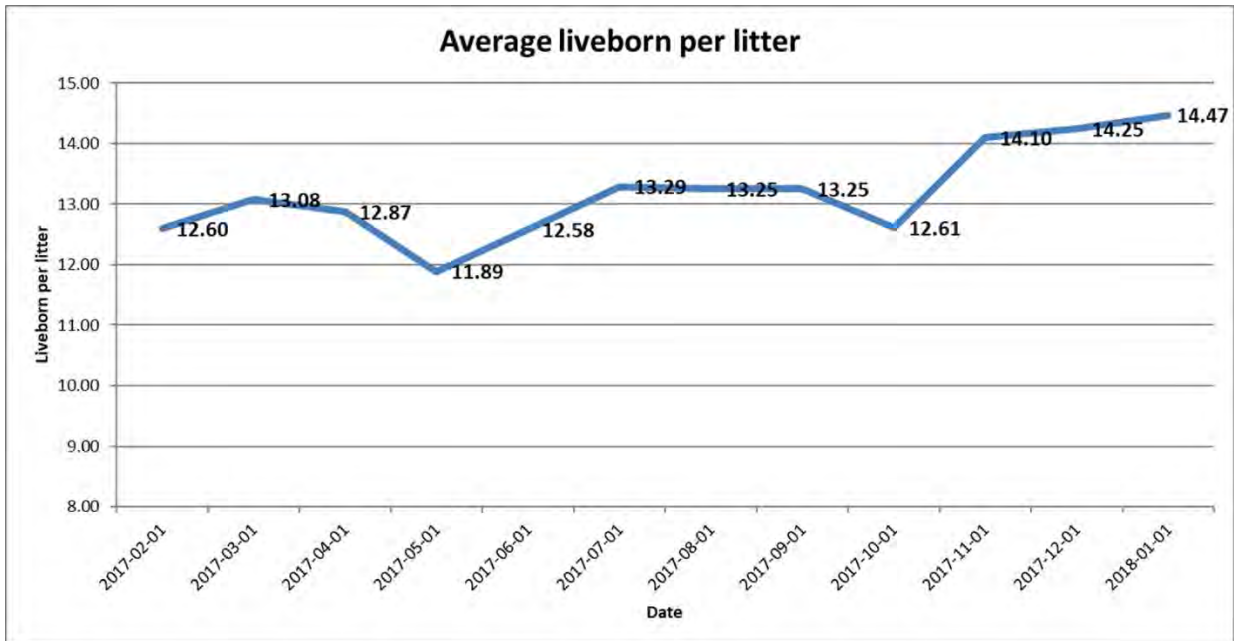
### **Nutraceuticals**

Many nutraceuticals used for hoof treatment are high in copper and zinc. These aided in the loose housing transition for the sows. Other products that we use in our waterlines range from acidification of the water, vitamin doses for a couple days and oregano oil for respiratory issues and overall health. Once every four weeks we will feed a stimulator in our gestation feed for 4 days and our sows pink up in skin colour and eat well. We also use two other nutraceuticals that are EC Max, which works for pain and mild fevers, and Eber glow that is packed full of vitamins. We follow protocols for all these products, but they have helped us treat individual sows without taking out the needles for antibiotics. Other vitamin injectables have been very beneficial in aiding the sow fight their issues without destroying their immune systems.

### **Tips for Producers in Reducing Antibiotic Usage**

First, Biosecurity is key as you need to keep the bugs out. Ventilation is important and keeping a low humidity environment doesn't allow the virus to continuously spread. Feed and nutrition is crucial, don't disregard other natural feed additives like kelp and garlic as they have healing capabilities. Acidify the water for sows and piglets to assist in the gut health. Maintain a vaccination protocol, learn to be proactive not reactive, try to be preventive and create a stronger immunity. Establishing a communication protocol with your Veterinarian, Feed Company and Genetic Company is key to understanding your overall outcome; you still have the final say but get all the information. Management and training in the sow barn is key. Having an eye for the little things, early intervention and awareness of swine behaviour is important in catching issues early before you need antibiotics. Finally, be open to change, if the result you are getting is not what you want try, try again.

## LIVEBORN AND PIGS WEANED



## CONCLUSIONS

Overall, maintaining an individual sow treatment plan has allowed us to maintain a high level of immunity in our sow herd. During the PRRS outbreak, the virus spread throughout the herd. Individual medications were administered to sows that required

treatment and it concluded that only 25% of the sow herd either in gestation or farrowing required treatment with antibiotics. The other 75% required no antibiotics and got through it with their own immune support. Some abortions occurred but the main death loss was in 4 weeks of nursery where piglets born PRRS negative were impacted the greatest. The next four weeks had low born alive due to larger number in stillbirths and for the next four weeks that followed mummified piglets were documented. Therefore, our piglets born alive was lower and piglets weaned per sow was an average of 23 for the 12-week period. Once the cycle had finished, the sow herd was immune to the PRRS virus, their piglets were born PRRS positive and contained the antibodies. The born alive began to increase as well as the pigs weaned per sow. During this outbreak we set up protocols to continuously administer vitamins and oregano oil in their water to help with respiratory issues. Antibiotics were never added to our feed.

Our focus is to continue to build on our sow herd immunity to give her adequate gut health to handle other flareups. We will continue to explore Nutraceuticals for immunity support. We maintain that early intervention is key for swine health and a focus on immunity is the way to go.

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John Van Engelen, Producer

#### **RESOURCES**

Pigknows Data – Silver Corners Inc data for the last 12 months



## FINANCIAL PLANNING FOR CAPITAL – READY TO BUILD?

Amanda Hammell and Cameron Charlton

RBC Royal Bank

South Western Ontario Agricultural Banking

[amanda.hammell@rbc.com](mailto:amanda.hammell@rbc.com) [cameron.charlton@rbc.com](mailto:cameron.charlton@rbc.com)

### SUMMARY

The windows are clean, the concrete is new, and the steel is shining as the sun hits the barn roof. You are walking through the yard into your new barn. There is a sense of accomplishment, a feeling of pride and feelings of relief. The newly constructed barn that you have spent numerous hours working towards is finally complete and in full production. As you work in the barn you reflect on the process, the planning, and the changes you should have made. Did you make the right decision? Would you do it again? As we drive the country roads of rural Ontario it is evident that many farm businesses have invested in infrastructure. Some buildings are a result of expansion, some due to replacement of worn barns, and others for diversification of their business operations.

Building a barn, completing a renovation, purchasing farm land or purchasing equipment all takes capital to complete. The amount of planning will depend on numerous things such as the amount of investment, the potential change in business operations and any external factors that could affect the build. The following information will help you in the process of acquiring capital to complete whichever project your farm business is looking at.

### BUSINESS PLAN

The term “business plan” can be overwhelming as many producers feel they need to hire an external individual to complete or they feel it needs to be filled with diagrams and tables and on colored paper. This is quite the opposite. A business plan helps you get to where it is you want to go and can be as simple as a word document or an excel template.

So you want to build a barn? The following is a view from the other side of the desk. How your banker is looking to you, and working with you to seek out that tapered financial approval.



### The Request

1. Why do you need a new barn or a new farm or an equipment purchase?
2. Is this investment to expand and grow your business or to replace existing infrastructure?
3. How does this impact the existing goals of my business?



4. How does this impact the future goals of my business? i.e. Succession Planning
5. Create a proposed budget for the build (quotes – fixed price or time/material, excavating, plumbing, electrical, and engineering).

### **Analysis**

1. Review of your historical information – 3 to 5 years of information. This includes reviewing your existing cash flow and leverage position of the business.
2. Cost of production in current environment – determine breakeven point.
3. Can the new barn financing be carried by the existing cash flow of the business or are you counting on the increased cash flow to pay the principal and interest?
4. Future cash flow of the business – projections approx. 1-3 years. This is where you might want to engage the professional services of your accountant.
5. Identify the associated risks to building – Cost overruns? Time delay? Environmental risks?

### **Structure**

1. Review your existing farm assets before the build/purchase and review of the assets after the build/purchase.
2. Many construction projections or farm purchases will require an appraisal to confirm the value of the assets.
3. Ensure that the asset you are financing matches the amortization of the loan. i.e. land 20 years, equipment 5-10 years
4. Land is a long-term asset therefore we match it with a longer term amortization.
5. Options for structure include Mortgage, Term Loan, or Lease.

### **Approval**

1. Once all of the questions have been addressed, then the lender will be ready to submit their formal application for approval.
2. Many lenders have a department that reviews all of the applications to review the collateral pledged to ensure there will be adequate cash flow to repay the loan request.
3. It is the responsibility of every lender to exercise due diligence when reviewing the application and formal approval.

### **Present to Client**

1. Once an application is approved, a formal letter will be issued outlining the terms and conditions of the loan.
2. The terms and conditions can include the amortization and payment schedule (monthly, quarter, annual repayment) and the financial reporting requirements (financial statements, projection or any other information required).
3. Pre-disbursement conditions may include: additional security may need to be registered (new collateral mortgage), fixed price contracts for construction or formal offer to purchase (for a farm purchase).
4. Sign the formal financing offer.

## AGRICULTURAL RISKS

Agriculture is changing at a faster pace in this generation than any other generation before. Producers used to worry about weather and getting grain to the elevator. In today's agriculture, challenges that producers face include disease outbreaks, foreign currency exposure, GMO debates, farm consolidation and of course – the weather. Farming has never been easy. More than ever trends like globalization, technology advances, and escalating costs have increased the complexity of farming. It is prudent to identify the risk areas on your farm and how they would impact your business going forward. A couple examples of Agricultural Risk are listed below.

- **Production** – Any event or production activity that results in changes in farm output. This can include weather, pests, diseases etc.
- **Marketing** – Any market related activity or event that leads to variability of prices farmers receive for their products or pay for their inputs. This may include increased land rent, increased fertilizer prices and decreased corn prices.
- **Financial Risk** – Events or activities that impact the financial health of the farm. Examples include increased interest rates, ability to meet cash flow needs, and availability of capital.
- **Human Risk** – All aspects of human interaction with the farm business such as employee management, transition planning, family relationships and overall health of individuals.
- **Legal Risk** – Any activity with legal implications such as contract arrangements, laws and regulations and public policy.

## 10 Essential Tips for Capital Spending

1. Do not rush the planning process. This is a long-term commitment.
2. Surround yourself with a great management team – Lawyer, Banker, Accountant Nutritionist, Veterinarian.
3. Be realistic in your financial scenarios; use a best case, worse case and most likely case.
4. Use trades people who have a good reputation for not only craftsmanship but being on time and budget.
5. Obtain at least two other quotes – preferably three.
6. Ensure you are compliant with all rules/permits (building, Environmental Farm Plan, Nutrient Management Plan etc.)
7. Ensure Budget has addressed overrun costs.
8. Be Flexible.
9. Patience is a virtue.
10. Be proud that your business is providing food for the world.

## **CONCLUSIONS**

The commitment to build a barn or buy a farm is a decision that has fit into the long-term goals of your business. The concept of the “harder I work the more money I will make” rarely applies in today’s agriculture. The concept of forward looking planning, marketing strategies and improved production practices will lead to more efficient barn operations. Engage all of your partners early in the planning stage.

As referenced by Joyce Meyer “I may not be where I want to be, but thank God I am not where I used to be”.

## NUTRITIONAL CONSIDERATIONS FOR SOWS IN TRANSITION TO LOOSE HOUSING

Hyatt L. Frobose  
JYGA Technologies Inc.  
32131 NE Trego Rd. Greeley, KS 66033  
[hyatt.frobose@jygatech.com](mailto:hyatt.frobose@jygatech.com)

### INTRODUCTION

From a structural perspective, the adaptation to group-housing in gestation is well underway across Canada. These infrastructure changes require considerable capital investment and planning by farm ownership and many different pen configuration and feed system options exist. While there are pros and cons to various group-housing strategies, several published reviews (McGlone 2013; Douglas et al. 2014) have indicated that group-housed sows can yield equivalent performance versus conventional gestation-stall housing. Emphasis is placed on can as several key risk factors (Buhr 2010) must be accounted for including: (1) producers must learn to manage group sow dynamics; (2) some spaces must be available for 'fall-out' animals; (3) feeding for body condition management is essential; (4) space allocation per sow is critical; and (5) the potential for severe productivity losses is greater in pens.

While all of the aforementioned are important considerations, the ensuing discussion focuses on how nutrition can play a role in mitigating these risk factors, as well as novel nutritional opportunities that now merit consideration with the transition to loose sow housing.

### GENERAL CONSIDERATIONS

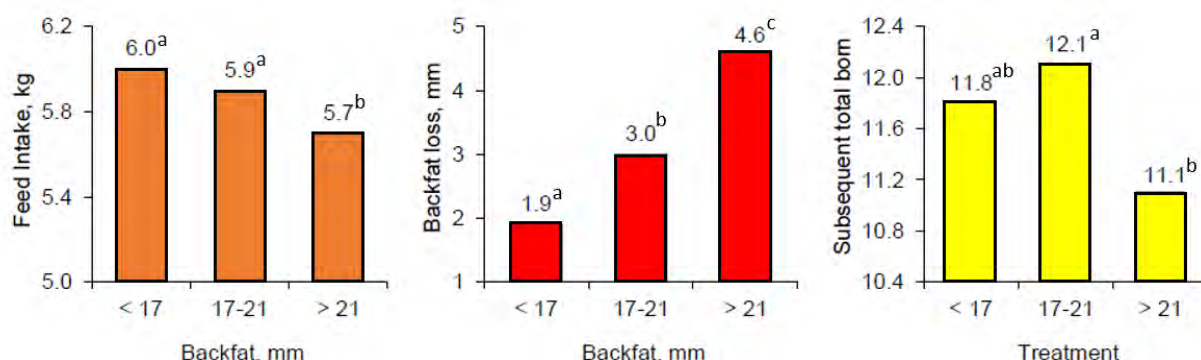
Regardless of housing system, the nutritional needs of gestating sows are comprised of her maintenance requirement, target maternal body weight gain, and the development of the conceptus and fetal tissues. These requirements are typically partitioned separately and several simulation models are available to predict them with accuracy. Maternal body weight gain and fetal development requirements have increased with the advent of modern hyperprolific genotypes (higher lean, less fat) and vary primarily based on parity and expected total born. Maintenance requirements are the most variable, and adjustments need to be made based on factors including sow size, health status, environmental temperature, and housing system.

Minimizing aggression is one of the primary concerns surrounding the management of group-housed sows. Aggression is known to be highest during the initial 24 to 48 hours after pen formation (Stevens et al., 2015). However, since the minimum feeding level needed for maintenance and fetal development is less than the sows' basal appetite (Weldon et al. 1994), ongoing aggression often occurs during feeding (competitive feed systems) or around access to feeding areas (non-competitive feed systems). These bouts of food-motivated aggression are the precursor for commonly referenced loose-housing disadvantages such as body condition variation and removals due to lameness or

abortions. Accordingly, optimizing nutrition for group-housed sows often centres on reducing food-motivated aggression.

## FEEDING STRATEGIES FOR GROUP HOUSING SUCCESS

**Optimization of sow body condition.** One of the most common problems seen on farms is over-conditioned females in gestation, and this is most common in gilts. Too often, gilts are bred late and are bigger than ideal when removed from ad libitum feeders, and then are not brought back into ideal condition before farrowing. In floor-feeding or shoulder stalls, this is usually related to an overfeeding of the whole pen to maintain condition in thin sows; whereas, in electronic sow feeding systems issues may relate to a failure to calibrate the system or misapplication of feed curves. These are costly mistakes, not only regarding wasted gestation feed. Young et al. (2004) showed that sows that were too fat at farrowing have reduced lactation feed intake, greater backfat loss in lactation, and reduced litter size in the subsequent lactation (Figure 1).



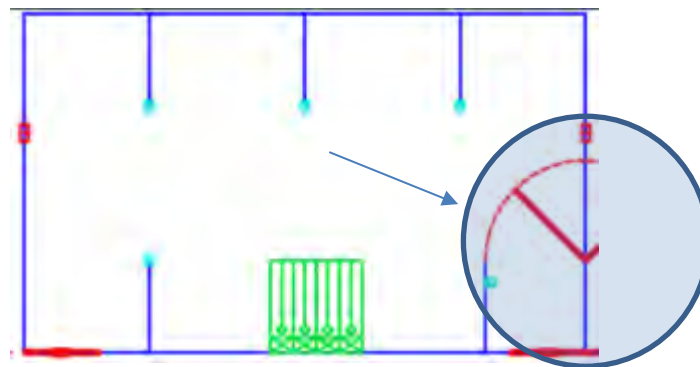
**Figure 1.** Effect of increased back fat at farrowing (Adapted from Young et al., 2004). Means without a common superscript differ  $P < 0.05$ .

Increasing management focus on consistently training employees for body condition scoring is critical. Many systems have successfully transitioned to objective-based measurements of body condition such as the sow caliper, backfat probes, or flank-to-flank measuring tapes to minimize individual observer bias.

If group-housed sows are competitively fed, such as floor feeding or shoulder stanchions, extra effort must be placed on assigning sows to pens based on parity and similar body condition, as there is no way to individually apply different amounts/rations to individual sows within these pens. Typically, these feeding systems result in slightly higher feed usage (~200 g/d) than non-competitive systems such as traditional or free-access electronic sow feeding systems (ESF). Managers must also take care to remove floor-fed/stanchion animals that are getting too thin or too fat, and dedicated spaces must be reserved in stalls/hospital pens for these 'fall-out' animals.

For ESF systems, sows can be placed on a “feeding curve” which can adjust the daily feed allowance to match her nutrient requirements based factors such as parity and BCS. The key for these types of systems is developing the proper feed curves and in training workers to recognize how to select the proper feed curve for individual sows. An important part of this feed curve allocation is training workers to assess body condition again in mid-gestation to determine if previously “thin” or “fat” sows have been brought back onto average curves maintain consistent herd BCS. Additionally, ESF systems also offer the ability to “auto-adjust” the feeding curves of initially fat or thin sows once they have received a sufficient correction of their feeding level to bring them back to an ideal condition.

**Removals/Fallout Sows.** A common oversight in group-housing facilities in new construction or retrofit barns is allocation of space for removals. If hospital pens or dedicated recovery crates are unavailable or inconvenient (too far from pens), workers are less likely to be timely on removing fallout animals before their condition deteriorates significantly. Ideally, every square inch of the barn is fully utilized, but a certain level of removals is unavoidable regardless of group-housing system. Commonly referenced removal rates are 3-5% of sows in non-competitive feeding systems (free-access and ESF) and as high as 10-15% in competitive feeding systems (stanchions and floor-feeding). A popular recommendation is to create an “optional hospital pen” where a hinged gate can swing into place with an existing nesting wall and 1 to 3 sows can be isolated from their pen mates while remaining adjacent to their breed group.



**Figure 2.** Example of an “optional hospital pen”.

**Calibration.** Failure to calibrate to account for differences in diet bulk density often causes body condition variation in gestation stall barns, let alone group-housing. Similar to gestation box drops, most electronic feed delivery units are volumetric and therefore require periodic re-calibration to account for dietary changes or differences in particle size. Calibration is an easy task, but can also be easy to forget. Synchronize a monthly calibration with other routine maintenance procedures to ensure calibration is updated regularly.

**Fiber Inclusion.** Since gestating sows are typically limit-fed to maintain body weight, aggression around limited resources (especially food) is common in group housing. In a survey of 104 French sow farms, Cador et al. (2014) reported significantly higher

incidence of major leg disorders for farms that fed less than 3.1 kg/d compared to those with higher feeding allowances. One way to increase the bulk density of the diet and therefore increase sow satiety is by adding dietary fiber (such as soybean hulls, wheat middlings or sugar beet pulp), which has been shown to reduce stereotypies, aggression, and improve sow welfare without affecting sow productivity (Sapkota et al. 2016). Of the various production classes of swine, gestating sows have the greatest capacity to utilize hindgut fermentation and the longest total tract transit time, therefore making gestating sow diets a good outlet for low-cost fiber by-product feedstuffs. An alternative to fiber inclusion in the diet is to offer fibrous enrichment materials such as straw bedding or a cache of edible fibrous material (think “hay rack”). Keep in mind however, high fiber ingredients are often highly variable in nutrient content, have an increased risk of mycotoxin concentration, and can cause logistical issues such as reduced feed bin capacity and increased likelihood of feed bin bridging.

**Lameness.** Data from the US shows that, on average, >50% of the sows are removed from the herd by the end of the second parity. Similarly, European data estimates an annual sow replacement rate of 40-53% (Interpig, 2010). This early sow removal is a major bottleneck in the swine industry. Lameness is the greatest cause of early removal of females in the herd and since lameness rates are higher in group-housed sows versus individual stalls (Maes et al. 2016), these removal rates are in danger of increasing as the percentage of group-housed sows continues to increase across North America and Europe. Beyond the desire to improve animal care, consider that since a replacement gilt does not pay for herself until at least the 3<sup>rd</sup> parity (Stalder et al., 2003), there is a clear economic incentive for producers to find ways to increase the retention rate of their sow herd.

While gilt selection and the animals’ environment play a significant role in the lameness equation, nutrition remains an important factor as well. Specifically, mineral nutrition is known to influence sow reproductive and musculoskeletal health. Enzymes used for normal biological processes such as collagen and cartilage development require trace minerals such as zinc, copper and manganese for normal activity. Currently, inorganic trace minerals (ITM) are the most common sources of these minerals due to their low cost. However, there is increased interest in the use of chelated organic trace minerals (COTM) for at risk animals (e.g. developing gilts, group-housed sows) due to their increased bioavailability and lower risk of antagonism with other nutrients in the diet. Although there appears to be limited additive reproductive benefit beyond that of ITM sources, supplementation of COTM has been shown to improve retention rates and reduce culling of sows due to lameness (Zhao et al. 2011).

**Bump feeding.** Increasing sows’ feed allowance by 0.5 to 1.0 kg in late gestation is common practice today due to the generally held belief that this feed ‘bump’ increases piglet birth weight (BW) and keeps sows from becoming catabolic postpartum. However, recent studies on bump feeding in modern hyperprolific genotypes have only shown modest benefit to piglet BW in gilts (Mallman et al., 2017) and no benefit to piglet birth weight in sows (Goncalves et al., 2015). While these responses have not been evaluated across all modern genotypes, in those that have been evaluated the practice of bump

feeding simply translates into increased maternal BW gain, unnecessary feed expense, and a concomitant increase in stillborn rates (Goncalves et al., 2015) and decreased lactation feed intake (Close and Cole, 2001).

**Parity specific diets.** Sows consume approximately 20% of the total feed consumed in the pork production chain, yet sow nutrition has received comparatively little attention. Gestation sow diets are generally formulated to meet the needs of the gilt. Typically a single common diet is fed to young and old sows alike due to the logistical and management constraints of most modern gestation-stall barns (one feed line, sows are typically assigned to stalls based on breed week). This results in routine over-feeding of nutrients to mature sows, in particular amino acids (AA), and represents a significant opportunity to decrease herd gestation feed cost.

As producers consider retrofitting existing facilities or new construction, it is important to consider whether feed can be delivered and sows managed in such a way to allow producers to capture cost savings on older sow diets. Given current female replacement rates at or above 50% per annum, the simplest approach may be to designate one half of the group pens for gilts and first-parity sows, and the remaining pens for older animals. In addition to feed savings, Li et al. (2012) reported that managing gilts and first-parity separately from older sows increased the farrowing rate of first-parity sows from 67% to 94%. In the case of ESF or free-access ESF feed systems, gilt pens typically require additional feed stations, and parity-segregated management may offer the ability to reduce the number of feed stations in the pens designated for older, “ESF-experienced” sows.

**Early gestation.** It is common in group-housed sow barns to keep sows in individual stalls until pregnancy check (d 28 to 42 post-breeding). For these barns, it is recommended for the breeding stalls and group sow pens to each have dedicated feed delivery systems to minimize out-of-feed events. This feed system segregation also creates an opportunity to feed “first-trimester” animals a diet tailored to this stage of gestation. Recent Australian data suggests that supplementation of omega-3 fatty acids during this period can increase embryo survival rate due to an increase in oocyte quality (Smits et al., 2013). This effect was most pronounced in older sows (parity 4 to 8) which are known to have lower embryo survival rates. In a separate study, feeding levels of vitamin B<sub>12</sub> and folic acid above typical supplementation rates increased total litter size of parity 2 and 3 sows by 0.6 piglets and decreased early pregnancy loss across all parities (van Wettere et al., 2011). By strategically feeding a diet tailored to early gestation sows, the incorporation of reproductively beneficial feed additives such as omega-3’s, folic acid and vitamin B<sub>12</sub> can be most cost-effective by only feeding these diets to one-third of the gestating females at one time.

**Reducing mixing aggression.** Various approaches, nutritional and otherwise, have been attempted to reduce the effects of aggression around the initial mixing event. Most have proven ineffective or impractical. The use of odour-masking agents has been shown to simply prolong the initial mixing stress, and compounds used to treat human aggression such as lithium chloride (McGlone et al., 1980) may offer promise but their use is unlikely due to regulatory limitations. A more practical approach is to simply offer newly mixed



sows full-feed for 24 to 48 hours. While this will result in a temporary increase in feed waste, full-fed sows should be more satiated and therefore more apt to lie down and less likely to seek out fights with new pen mates.

**Precision phase-feeding.** Historically, swine barn design (e. g. single feed line, lack of electronic feeding technology) has prevented swine producers from precision-feeding sows. However, the adoption of technology such as ESF or free-access ESF systems now also offers the ability to custom blend two or more diets to an individual sow based on her age, body condition, or stage of gestation. Various nutritional model predictions indicate energy and AA requirements differentially increase in late gestation and some preliminary experiments appear to substantiate this hypothesis. Nevertheless, at present there continues to be a severe lack of data demonstrating commercial production benefits to support these biologically-based model predictions. The ability to deliver and blend tandem diets concurrently also requires infrastructure investment such as added feed bins and feed lines, as well as the diet blending mechanism itself. Therefore, the concept of precision phase-feeding of gestating sows merits further research and industry investment. At present, there appears to be a biological basis for phase-feeding gestating sows, but there is currently not enough peer-reviewed evidence to support or refute the widespread application of this technology.

## CONCLUSIONS

There are many opportunities to re-think gestating sow nutrition with the transition to group-housing. Properly managed with the right care and attitude, many different group housing feeding systems can result in performance similar to gestation stalls. Group housing does present challenges for sow nutrition such as increased risk of lameness, but various feeding options and strategies are well-known that can offset these risks. Similar to feeding sows in individual stalls, execution at the slot-level is often the limiting step. Future opportunities exist to reduce feed costs, minimize aggression and increase performance of group-housed sows through utilization of new technologies and feeding strategies.

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## THE HUMAN SIDE: STRESS AND MENTAL WELL-BEING ON FARM

Andria Jones-Bitton\*, Briana Hagen, and Terri O'Sullivan

Department of Population Medicine, Ontario Veterinary College, University of Guelph  
50 Stone Road East, Guelph, Ontario, N1G 2W1

\*[ajones@uoguelph.ca](mailto:ajones@uoguelph.ca)

### SUMMARY

A recent national survey of Canadian farmer mental health (Jones-Bitton et al., unpublished) has helped stimulate discussion of mental health in the agricultural sector. Indeed, farmers worldwide are reported to experience occupational stress, depression, anxiety, suicidal ideation, and suicide at levels higher than other occupational groups and population norms (Fraser et al., 2005; Hounscome et al., 2012).

This interactive workshop will build upon the presentation given at the London Swine Conference in 2017. First, the results of the national survey will be briefly reviewed in order to provide context for the subsequent workshop discussion. A panel of producers, a veterinarian, an industry representative, and a farmer mental health researcher will then engage in an interactive discussion, including questions and comments from the audience. Discussion topics will include: farm stress, how farmer mental wellness impacts farming, how to recognize signs that a farmer may be struggling with their mental health and what can be done to help, and farmer help-seeking for mental health. A brief overview of the concept of resilience will then be provided, using the Eight Dimensions of Wellness (Figure 1) and a breakout session used to brainstorm practical ways farmers can help increase their resilience in order to better protect themselves from the stresses inherent in farming. This session will be highly interactive in nature, and attendees will leave with an understanding of mental health in Canadian agriculture and tangible ideas for building their resilience skills.



**Figure 1.** The Eight Dimensions of Wellness (from: <https://www.samhsa.gov/wellness-initiative/eight-dimensions-wellness>).

## **CONCLUSIONS**

The stark realities that farmers face in terms of stress and mental well-being has led to farmer mental health programs in several countries that focus on building farmer health and resilience (e.g. National Centre for Farmer Health, 2017). Farmer mental wellness efforts in Canada are gaining momentum. The Eight Dimensions of Wellness can serve as a helpful model for farmers in building their resilience skills. This workshop involved an interactive discussion of farm stress, farmer mental health and its associated impacts on farming, mental health literacy training for people in the agricultural community, and practical strategies farmers can use to help build resilience so they can thrive in spite of the challenges inherent to farming.

## **ACKNOWLEDGEMENTS**

We gratefully acknowledge the producers who participated in our national survey and research interviews, as well as the participants in the workshop panel, who have all shared their stories with us. We also acknowledge the research funding provided by the following organizations to the Jones-Bitton lab to support farmer mental health research: the Ontario Ministry of Agriculture Food and Rural Affairs – University of Guelph Partnership (Emergency Management program), Ontario Sheep Federation, Ontario Pork, Egg Farmers of Ontario, Ontario Federation of Agriculture, and the Canadian Animal Health Coalition.

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## **Day 2: Main Sessions**

# **INNOVATIVE DIET FORMULATION ARISING FROM EXTERNAL PRESSURES ON OUR INDUSTRY**

## ***The CFM DE LANGE Lecture in Pig Nutrition***

**John F. Patience**

**Department of Animal Science, Iowa State University**

**201B Kildee Hall, Ames, IA 50011**

[jfp@iastate.edu](mailto:jfp@iastate.edu)

### **ABSTRACT**

Dr. C.F.M. de Lange was an innovator and a visionary in swine nutrition – someone who seemed to anticipate changes in the feeding and management of pigs. As a result, he was often at the forefront of new knowledge and new technology. Therefore, it seems fitting to honour Kees' memory with a look at how swine feeding and nutrition might change in the future, the consequence of a changing marketplace, evolving technologies and anticipated legislation and regulation. Farmers used to have complete freedom to make the decisions they thought best for the production of food on their farm. This paradigm is changing as the consumer seeks to know more about the production of food, and, rightly or wrongly, to impose restrictions on certain practices and technologies. All of this will likely result in changes in how pigs are raised, what they are fed, and how they are managed. The simple conclusion is that success in pork production in the future will demand that farmers are flexible and able to accommodate change. It is most likely that the changes will be evolutionary, not revolutionary. It will behove pork producers to ensure that their ability to be financially successful is preserved through education, negotiation and communication. Ultimately, whether we are discussing pork production in 2018 or 2038, stockmanship and husbandry will be essential for success – that is the way it has been for the 60 years of pork production that I can remember.

### **TRIBUTE TO KEES DE LANGE (April 19, 1961 - August 1, 2016)**

Dr. Kees De Lange was first appointed Assistant Professor in 1994, rising through the ranks until his promotion to Full Professor in 2003. Prior to his appointment at the University of Guelph, he was a Research Scientist at the Prairie Swine Centre (1992-1994) and swine nutritionist with Ralston Purina Canada (1989-1992). Following early degrees earned from Wageningen Agricultural University, he received his Ph.D. from the University of Alberta in 1988.

Kees published over 150 refereed journal manuscripts, 3 books and 28 book chapters. His research has been cited more than 7,000 times. His publications generated an impressive H-index of 43 and an i10 index of 123. Not only did he supervise more than 50 graduate students and post-doctoral fellows., he also received the top nutrition awards from the Canadian and American Societies of Animal Science, three Distinguished Faculty Awards from the University of Guelph and the (Ontario) Premier's Research Excellence Award. In addition, he was selected to deliver the prestigious T.K. Cheung Lecture at the University of Manitoba.



Kees was a global thought leader, making contributions in modelling, in energy and amino acid metabolism, in liquid feeding, and in ingredient evaluation. While the breadth of his research revealed great diversity, he also delved deeply into each topic. His breadth of investigation afforded him the opportunity to develop a level of knowledge of swine nutrition at the metabolic level that was without peer.

What really made Kees so special in his research was his relentless search for a better understanding. He was not satisfied with simply developing new knowledge; he wanted to achieve greater understanding as well. However, even that did not satisfy him because he also wanted to see this information applied on the farm. To Kees, research and the resulting new knowledge was a means to an end, not an end unto itself. He felt that if this new knowledge was not applied in order to improve the efficiency and sustainability of pork production, then it fell far short of its value to both science and to society.

This drive for knowledge and understanding made him an outstanding mentor of graduate students and a great teacher. Kees was described by his students as keen, helpful, hard-working and knowledgeable – and to some, a hard marker. Yet, he never expected more of others than he expected of himself. It was this drive to continually achieve excellence in all he did that made him such a success.

## **CHANGING FORCES**

Farming and the production of food has entered tumultuous times. Farming has always been an uncertain business, due to the vagaries of the weather, market prices, feed costs, disease, and trade issues. Indeed, many of the new financial technologies and tools used by farmers today have been developed to minimize risk and achieve some degree of medium-term income stability. Previously, it was assumed that if a farm is fiscally prudent and highly productive, success is reasonably assured, or at least the risk of failure is diminished compared to less efficient farms. Experience has shown that this may have been true up until the 1970s or 1980s, but is no longer. Success in farming today requires much more than production efficiency.

### **Changing consumer marketplace**

In the last few decades, we have seen the marketplace become much more involved in production practices. The ability to sell product is increasingly uncertain because it is being influenced by downstream forces. Consumers, or at least some consumers, have demanded a say in how their food is produced. Examples are well-known to this audience, and include topics such as laying hen cages, gestation crates, antibiotic growth promotants and GMOs. There is scant evidence to suggest that this situation is going to change any time soon; indeed, the market is likely to impact production practices even more in the future than in the past.

Often, these consumer trends are embraced by food retailers and restaurants, who see a marketing opportunity. They have come to understand that underneath all of the controversy, lies a fundamental desire by consumers to know where their food comes from and how it is produced. McDonald's has a website devoted to this topic.

What exactly is it that the “consumer” wants? First, we need to be clear that the consumer is not a homogeneous creature, but rather one with many parts that overlap in some areas, but are very distinct in others. All consumers want some assurance that their food is safe; it is therefore ironic that there are many recent examples of high profile outbreaks of food poisoning traced to markets that present themselves as safer than their competition. Is it any wonder, then, that the consumer is confused about food safety and does not know who to believe or who to trust?

Part of the problem surrounding consumer confidence is rooted in what might be called opportunistic marketing. Producers, wholesalers and retailers promote the advantages of their particular product, which by dissociation, impugns other sources of similar product. When the specialized product is found not to be superior, the consumer does not conclude that their prior food source was actually fine, but rather loses confidence in all food sources. On this basis, it would seem that such marketing strategies may provide short-term advantages but lead to longer term problems that might be much more difficult to deal with: eroded consumer confidence in the food supply.

Food safety is an underlying factor in the decisions of many consumers. This helps to explain the growth of a diversity of diets, some of which are passing fads and others with greater staying power. Examples include the Atkins – or low-carbohydrate – diet, the Paleo diet, the Mediterranean diet, the South Beach diet, and so on. These diets are based on people’s beliefs that certain diets will lead to greater health and longevity – and reduced illness. Of course, some are motivated by their desire to lose or manage their weight.

Consumers also want convenient food products: ready to prepare foods, fully prepared take-home meals and restaurant meals. In 2014, millennials spent 44% of their food dollars eating outside the home; the comparable value for baby boomers was 40% in that same year. The trend to greater food expenditure outside the home began back in the 20<sup>th</sup> century and is expected to continue.

The phenomenon of niche markets is expanding; these markets might include organic or so-called natural production practices. They might even include specific breeds of pigs whose meat is being sought by high-end restaurants and meat markets. This trend is more prevalent in eggs, with attendant controversy surrounding the relative nutritional value of brown eggs vs. white eggs or even green eggs, but applies to almost all food products. While niche markets represent a very small portion of pork production, there is no disputing that in developed economies, organic pork, for example, is growing at a pace much greater than conventional pork. Nonetheless, it remains a very small fraction of the total marketplace.

The use of antibiotics in feed for both growth promotion and disease prevention and treatment has become controversial in the past decade. While this used to be the purview of the organic movement, it has moved into mainstream food markets in recent years. Increasingly, restaurants and food retailers are sourcing meat from reduced antibiotic or “never any antibiotics” producers.

## **Legislation and regulation**

The rise in consumer influence on farming is being reflected in the increasing role of government in regulating production practices. In the US, gestation stalls and caged layers have been banned by a number of state legislatures; in some cases, states are also trying to prevent the importation of eggs from states not adhering to their regulatory standards. In this way, government regulation is attempting to affect internal trading patterns. Such legislated restrictions have not yet moved north into Canada, although the pork industry there has been adopting its own code of practice; as of 2014, the construction of new barns with gestation stalls is forbidden and gestation stalls will be eliminated altogether by 2024 (National Farm Animal Care Council, 2014).

Legislation and regulation have expanded in the area of environmental standards as well, especially as they relate to manure management. Adopting precision agriculture cropping methods maximizes the fertilizer value of manure and provides the greatest financial benefit while concurrently minimizing its impact on the environment.

One of the unfortunate “unintended consequences” of increasing regulations is the relatively greater financial burden and management pressure placed on smaller farms. Due to their size, they are least able to implement the greater administrative requirements and record-keeping that inevitably follows legislation. These added overhead costs can rarely be passed up the food chain. Consequently, a greater regulatory presence makes it even more difficult for smaller farming operations to survive.

Increasingly, animal feed manufacturing is viewed in a similar manner as human food processing, with attendant restrictions. It is therefore likely that a stricter regulatory environment will evolve, with greater restrictions on antibiotic use, ingredient selection, and manufacturing and delivery practices as well as greatly increased and more detailed record keeping.

## **New technology**

One of the reasons I have enjoyed my 40+ years in the pig industry – not including my time on the home farm – has been the rapid pace of adoption of new technology by pork producers. This, in turn, has resulted in huge increases in productivity. As an example, today's sow produces on average 2,226 kg of pork per year (carcass basis; US data). In 1975, a typical sow produced only 719 kg of pork per year; this represents a tripling in sow productivity over the course of 4 decades, or about 5% per year! I am sorry I could not find comparable Canadian data, but I am sure the message would be the same.

Even with these tremendous gains in productivity, the industry is far from finished. Exciting new technologies are on the horizon, including CRISPR (gene editing) and sexed semen, to name two.

An increasing proportion of new knowledge will be proprietary. Private research facilities publish a small fraction of their research results if they publish at all. These producers understand that knowledge is power, and having access to the best possible knowledge represents a competitive advantage in the marketplace.

Technology will also challenge the pork industry, because it will create new, and possibly unexpected, competition at the meat counter. Other meats will become more efficient, so pork will have to ensure it maintains its focus on productivity and efficiency. Furthermore, fish is increasingly competitive, and increasingly available in markets where it previously may have been a rarity. If conventional meats are not enough to worry about, synthetic meats are making great strides in development. Also, insect meal appears to be gaining greater traction, and is a serious enough component of the protein market that regulatory agencies in the EU have developed procedures for its evaluation and approval for use.

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How will these and other trends in the marketplace impact the way we feed pigs in the future?

## **RESTRICTIONS ON ANTIBIOTICS IN THE FEED**

The issue of antibiotic resistance will not go away, and as a person who will probably need effective antimicrobial drugs at some time in the future, I am glad the topic is being taken seriously. There is ample literature to support the claim that resistant bacteria are an increasing threat in human medicine; the same will apply in swine medicine as well. The contribution of animal agriculture to the problem in human medicine is not well defined, but it is clear that we are viewed as part of the problem and therefore also part of the solution.

New regulations in the US and the EU, as well as pending changes in Canada, clearly show that the use of antibiotics at sub-therapeutic levels for the purpose of growth promotion is a thing of the past. This poses both challenges and opportunities to swine nutritionists. In the past, diets have been formulated largely on the basis of energy and nutrients, with the objective of fulfilling the needs of the pig for maintenance and growth/lactation/gestation at the lowest possible cost. The one exception is in nursery diets, where some attention to the functional properties of ingredients is considered. This will change in the future, as we see more and more evidence that certain dietary ingredients or constituents of ingredients can either help protect the pig from the impact of infection, or make the pig more susceptible. This will be a topic of increasing research activity in the near future, and will no doubt find its way into routine diet formulation.

The use of water medications will increase, although not because they have escaped the attention of regulatory bodies, because they have not. Rather, drinking water has several advantages over feed as a vehicle for delivery. When needed to address a specific disease outbreak, medication can be delivered to the pig more rapidly than feed, and can be removed more quickly when no longer required. Water can be delivered to individual pens, if required, rather than wholesale to the complete barn, something that is more difficult to achieve with feed. Finally, sick pigs are more likely to drink water in suitable quantities than to eat feed. There are some downsides, however. Sick pigs may still not be drinking sufficient water, depending on the severity of their illness. There is

considerable waste in the delivery of water, which translates to waste of the medication. Finally, there is a need to quantitatively understand normal water intake and water intake under conditions of thermal stress or illness.

Zinc, and specifically zinc oxide, is often used in the diet of young pigs as an antimicrobial, with particular efficacy against *e. coli*. However, the use of zinc oxide at antimicrobial levels has been found to create antibiotic resistant *e. coli* (Bednorz et al., 2013). Zinc oxide use has been severely restricted in the EU, due to accumulation in the soil following manure application. Therefore, with these environmental issues and health implications surrounding the use of zinc oxide as a feed additive, its use may be restricted in North America as well.

## **NOVEL FEED ADDITIVES**

There is an almost exponential growth in the number and variety of feed additives available to the pork industry (Schweer et al., 2017). They fall into numerous categories, and at the present time include, but are not limited to, direct-fed microbials, prebiotics, botanicals, organic acids, yeasts and lysozymes. These products represent possible alternatives to sub-therapeutic use of antimicrobials, but they are unlikely to serve as complete replacements of antibiotics in the treatment of disease, at least not with the technology available at the present time. Indeed, some of these products have been found to improve the effectiveness of antibiotics added to the feed for disease control or prevention.

Recently, it was announced that the EU had developed a regulatory process by which manufacturers of insect meal can seek approval to market their products into animal feed markets.

## **COMPETITION FOR INGREDIENTS**

The rapid expansion of the biofuels sector, and especially ethanol production, put a chill on animal agriculture in the mid-2000's. Currently, about 30% of the total US corn crop is destined for use in producing ethanol. But there are other industrial uses of corn, such that only about 38% of the US corn crop is used in animal feed on an annual basis. Of that, about 20% is used to feed pigs domestically.

Otherwise, corn is used for such diverse functions as the production of alcohol, sweeteners, high fructose corn syrup and cornstarch. It is not unreasonable to expect that a greater portion of the corn crop will be diverted away from livestock feeding to other, more lucrative markets, especially those related to fuel production and to human food products. Therefore, the pork industry can expect to face increasing competition for basal diet ingredients, which means either greater use of co-products or higher feed costs, or a combination of the two.

## **ANIMAL PRODUCT FREE DIETS**

There is a growing market for animal products harvested from animals that have been fed diets of only vegetable origin. The memory of BSE, exacerbated by feeding cattle co-

products back to cattle, remains vivid in some minds. While the pig is clearly an omnivore by nature and evolution, some companies are selling pork produced with a 100% vegetable diet. In support of this production system, it is argued that animal products are more likely than plant products to be contaminated with bacteria or viruses. I am not at all sure that this assumption is correct. Nor am I sure there is any scientific reason to feed vegetable-only feeds to pigs.

## **IMPACT OF NEW TECHNOLOGY IN GENETICS**

The feeding of the hyper-prolific sow is one of the greater challenges facing nutritionists today. In part, this is due to the rapid increase in reproductive productivity combined with a terrible deficit in sow research. As a result, there is great uncertainty on how to feed the developing gilt and how to feed parity 1 and 2 animals during lactation as compared with older parity animals. There is even less data on feeding the boar than the gilt. Fortunately, there is some excellent and exciting work being done in Europe that will greatly help to fill in some of the gaps in our knowledge.

## **FEED MILL BIOSECURITY**

Feed mill biosecurity will become increasingly important in the future, although it is already very important. Feed trucks are a potential source of disease transmission, as is the feed itself. The extent to which feed represents a risk is very poorly understood. There is sufficient research to confirm that it represents a potential risk, but the extent to which it represents real risk is, I think it is fair to say, unknown.

Nonetheless, as mentioned previously, feed production will increasingly be regulated in a manner similar to food production, and contamination from any source, including rodents, birds, and people, will come under increasing scrutiny in the future.

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**WHEN THE OPPOSITION PLAYS DIRTY:  
TALES FROM THE TRENCHES OF ADVOCATING FOR MODERN AGRICULTURE**

**Trish Jordan  
Public and Industry Affairs Director  
Monsanto Canada**

The current consumer dialogue around food and modern agriculture poses a challenge for those of us in agriculture. There are days when it feels like a relentless attack, not only on companies like Monsanto, its people and our products, but also on the agriculture sector as a whole – including you as members of this great industry and including the farmers who you work with every day.

The growth of social media has had a significant influence on consumer perceptions of agriculture. From Twitter to Facebook to blogs and websites – everyone has an opinion about agriculture and how food should be grown.

In my line of work, I talk to a lot of skeptics, conspiracy theorists and opponents of modern agriculture. The folks I talk to are concerned primarily about chemicals and genetic engineering or what consumers call GMOs, but the issue of hormones and antibiotics also comes up regularly and I am sure these are the hot topics you get asked about in your line of work.

Now, I am by no means an expert in the animal side of agriculture but I expect that many of you in this room have found yourself trying to defend your use of the tools or practices you use to keep animals safe and healthy. So, whether it's chemicals and GMOs or antibiotics and hormones in beef or chicken, we share many of the same challenges when it comes to helping consumers.

How did we get to where we are today? How have activists, particularly the organic activist movement and environmental, lifestyle and socio economic advocacy groups influenced perceptions of modern agriculture and what tools have they used to create the debate about what is good and bad in agriculture today? Well, like most things it starts with developing a playbook that works and then putting millions of dollars behind that plan to ensure successful execution.

Today there is a coalition of groups and individuals who number about 300+ different anti-GMO, pro-organic groups who do this sort of thing for a living. Some are multinationals while others are small, grassroots groups who have a different vision of agriculture and food – one that does not involve plant science technologies, pesticides, or antibiotics.

The scary fact is this coalition is funded to the tune of \$3 to \$4 billion USD annually. And what do they do with all that money? They attack modern agriculture and create fear and confusion with the objective of scaring consumers – all to serve their own positions or support their own businesses.



I personally find it perplexing that so many people seem to be turning their backs on science and technology or are willing to argue that innovation is bad, particularly when you consider that the large majority of consumers accept science and technology in every other aspect of their lives – from medicine, to cars, to entertainment, to their iPhones and computers – yet they are not prepared to let farmers utilize science and technology to grow food better.

Sometimes we can let all this negatively encompass our every thought or think the problem is “insurmountable.” But I want to be clear that the folks who think this way are in the minority (probably around 10 to 20% of the population). They are the ones who “play dirty,” share fictional stories, set up the simplistic narratives of big is bad/small is good; organic is healthy and nutritious/GMO is unsafe; animal protein is bad/we should all move to plant-based proteins.

No doubt there are challenges but I believe it is worthwhile, if not a critical necessity, for everyone involved in agriculture, to make the effort to engage with the non-farming public. A collective approach to telling our stories is required to change the perception of modern agriculture and maintain your ability to provide the solutions farmers want – and need – to grow abundant, safe food for a growing world population and do it in a way that uses less.

## **THE CONSUMER SETS A QUICK PACE FOR GROCERY RETAIL**

**John F.T. Scott**

**Canadian Agri-Food Policy Institute**

### **Presentation Synopsis**

The presentation is designed to inform the audience of the social and economic dynamics affecting decisions, trends and investments in the grocery sector. This \$110 Billion vital component of the Canadian economy is subjected daily to rapidly changing consumer needs, attitudes and whims. In a highly competitive market each store requires a point of differentiation that is first embraced by a significant segment of consumers and able to be adjusted quickly. Each also represents a substantial investment which underscores the imperative to “get it right”.

There are several critical consumer expectations that are embraced by retailers. The first two underlying principals are that the grocer will always be on the side of their consumer and that visible steps are taken in store and through procurement to ensure that products are safe. The three critical elements which have emerged and been exacerbated by the ability to verify information through electronic means are:

- What is in the food?
- Where and how was the food produced?
- Who is behind the food?

What plus where plus who leads to “trust” in the food and the grocer. Consistency in earning and sustaining that level of consumer trust is essential to the growth and development of the business. However, a single contrary incident brings swift and harsh judgement from a discerning consumer.

Consequently, product procurement by retailers goes much further in this environment than ever before (it is important to remember that large retailers can stock up to 30,000 SKUs (stock keeping units) in a single store). It remains essential that the retailer must be convinced of six things before listing a product – quality, quantity, delivery consistency, marketing support, competitive pricing and trade incentives. Adding to that the retailer now must be confident that each supplier can guarantee and speak to (if required) four social issues of increasing interest regarding a product – Providence, Ethics, Health and Sustainability.

In planning to list a product each supplier must assess each retailer to determine which is best suited. Each retailer is trying to satisfy a specific consumer need and the “go to market” strategy will vary – sometimes quite significantly. A supplier is advised to carefully research the market to ensure their product is placed where it can best support the retailer’s orientation.

There are five types of retailers in the Canadian market with a sixth (on line grocery) just emerging. Discount now accounts for in excess of 50% of market share. Those supplying discount must be conscious that the trade off for higher volume is reduced margin based

on price point. Discount also has a disproportionate share of the sales of packaged goods.

Traditional supermarkets, while being the most prevalent, are struggling in this market which is heavily oriented towards clear identification of differentiation. Each of these companies are reducing space for packaged goods and focusing on a “farmers market” approach featuring higher margin perimeter sections including produce, full and self serve meat, fresh seafood, exotic cheese, deli, fresh bakery and exceptional prepared foods. Fresh suppliers can often strike a chord if their product and marketing support one of these strategies for they are all seeking help in growing the market (which has been static or declining for some time).

Grocerants are emerging particularly in urban areas. These stores lean heavily on fresh and prepared products with minimal or only unique packaged goods. Price is less of a criteria but any aspiring supplier should be aware that the trade off for higher margin will be lower volume. Grocerants often locate near to discount stores for they complement rather than compete

Canada has experienced widespread immigration and as people arrive from different cultures around the world they crave access the food of which they have been accustomed. This has stimulated the development of culture specific stores some of which have become mainstream. Often their method of product procurement is as unique as the store itself! Suppliers have found in such instances that securing a listing results in welcome long-term loyalty.

The fifth and rapidly growing segment is “adventure” discount which is a bit of a treasure hunt for consumers. Securing a listing is tough and can often be short term. On the other hand – because of encouraged bulk buying margins are fair which can mean a welcome short-term gain.

The race to crack the slowly growing on-line market with efficiency, great product and market penetration has accelerated since the acquisition of Whole Foods by Amazon in 2017. All retailers are engaged, and suppliers need to be conscious that packaging of fresh product to gain consumer acceptance for on line shopping has been prolific at retail for some time. While an exciting component of grocery retail – growth in Canada is expected to continue to be slow except in major cities.

The presentation concludes with revisiting the key element of trust and a quick profile of the success two retailers have found by embracing that point of differentiation.

## **FUTURE OF PROCESSING IN ONTARIO AND NORTH AMERICA**

**Craig Klemmer**

**Principal Agricultural Economist, Farm Credit Canada**

**1800 Hamilton Street, PO Box 4320, Regina SK S4P 4L3**

[craig.klemmer@fcc-fac.ca](mailto:craig.klemmer@fcc-fac.ca)

In the Canadian swine industry, the future direction of the processing sector remains uncertain. Total exports of live pigs from Canada has increased at a faster rate than exports of pork. Recent investment and modernization of processing capacity in the U.S. is creating export opportunities for some but at increased costs for the producer. What does this all mean for the future of the domestic processing sector?

In this presentation, Craig will discuss the domestic processing sector, and how it is affected by larger trends in the agricultural marketplace, Canadian exports and the overall Canadian economy.

Craig will also discuss the impacts on the producers' bottom line. A better understanding of your bottom line will enable you to assess risks to avoid and opportunities worth pursuing in the North American pork processing industry. A big factor to consider is effect of the Canadian dollar on the agri-food supply chain in 2018. Other key drivers affecting your bottom line in the coming year include energy prices, commodity prices, the U.S.-Canada investment landscape, and of course, global economic changes.

Global demand for Canadian ag commodities – including pork – continues to increase. Demand for protein is strong both domestically and internationally. Craig will explain how pork producers can work for both immediate and long-term viability, through better efficiency, but also through increased productivity. Improved efficiency will allow you to survive through periods of low commodity prices and uncertain markets. Meanwhile, advances in agricultural technology and innovation can allow you to increase your productivity.

## **Day 2: Workshop Sessions**

## **MANAGEMENT AND FEEDING TO MAXIMIZE EFFICIENCY, CARCASS QUALITY AND PROFITS**

Joel DeRouchey<sup>1</sup> and John F. Patience<sup>2</sup>

<sup>1</sup>Kansas State University: Department of Animal Sciences and Industry  
222 Weber Hall, Manhattan, KS 66506

[jderouch@ksu.edu](mailto:jderouch@ksu.edu)

<sup>2</sup>Iowa State University: Department of Animal Science  
201B, Kildee Hall, Ames, IA 50011

[jfp@iastate.edu](mailto:jfp@iastate.edu)

### **UTILIZATION OF WET/DRY FEEDERS**

Several studies comparing dry feeders to wet dry feeders found that pigs fed with wet/dry feeders in general had 5% increased gain and intake and ate a similar quantity in a shorter time period than pigs on dry feeders. However, changes in feed efficiency were variable or unchanged while backfat is generally slightly increased. In experiments with recently weaned pigs wet dry feeders have not performed as well as dry feeders.

### **FEED PROCESSING**

#### **Pellets**

Most generally a 4-6% improvement in feed efficiency and ADG is seen with high quality pellets. If greater than 30-40% fines at the feeder, improvements are virtually lost. Pelletizing allows for great by-product use, improved flow ability of feed. The decision to use pelleted diets is not always an easy one. We must also consider the additional manufacturing cost to obtain the pellets, pellet quality, pig health, and specific genetic lines when determining if pelletizing is a viable option.

#### **Particle size**

For grow-finish pigs, 100-micron change in cereal grains alters feed efficiency by ~1.2%. For nursery pigs, particle size under 500 microns may not show similar improvements and decreased feed intake in meal diets. More debate in sows as to “ideal” particle size. Data clearly shows in lactation efficiency improvements by reducing particle size. With slower rate of passage of digesta in gestation, some advocate for larger particle sizes to reduce ulcers, little data to make confident decisions.

### **FEED BIOSECURITY**

Part of every farm bio-security plan should include feed protocols. Aspects of these can include feed mill ingredient risk, ingredient receiving design, flush procedures, delivery scheduling, and trucker procedures. Also on farm feed bio-security such as properly maintained on-farm feed equipment (bins, lids, augers), left-over feed protocol and potential at-risk ingredient use in purchased products/additives.

## **SORTING**

Producers have generally stopped sorting weaned and finishing pigs into pen weight groups. The exception is the lightest 5-10% in weaned pig groups so that they can receive additional care and feed budget attention. Sorting pigs by size into pens has been shown to reduce overall exit weight and not alter variation of population pig weight within a barn.

## **HERD HEALTH**

### **Impact on performance**

Disease challenge not only impacts growth rate and feed efficiency but also variation in bodyweight at marketing. Disease can reduce growth rate and thus market weight, feed intake and feed efficiency. Carcass composition, other than weight, is often unaffected by a disease challenge. Feed intake is one of the biggest issues with health challenged pigs; reductions in feed intake of 10% or more have been reported, with an associated drop in growth rate of 10 to 15% and poorer feed efficiency, as well.

As mentioned above, the smallest 5 to 10% of pigs are placed in separate pens in the nursery, so they can receive a unique feed budget and perhaps additional care and attention. Most barns also have a sick pen or pens for pigs falling behind or otherwise needing special medical attention. It should be recognized that pigs in the sick pen are not just “sick” but they are probably not eating well, and they are likely fighting some type of infection. Both of these conspire to chill the pigs below what is comfortable. Most of us have seen pigs in the sick pen piling or huddling, telling us they are chilled. Therefore, sick pens should receive supplemental heat, as the temperature in the barn that is comfortable for healthy pigs will be too cold for sick pigs.

### **Impact on net income**

A recent study on a multi-barn commercial research farm showed that a health challenge reduced net income per pig by as much as \$21 per pig placed or \$25 per pig sold. A low health challenge 2,400 hd barn reported a net income of \$34,000, but that same barn with severely challenged pigs lost \$16,000, a swing of \$50,000 in one fill!

## **WATER**

### **Quantity**

We must stop assuming that simply making water freely available to pigs ensures that their intake will be sufficient. For example, litters with the poorest growth rates have been associated with sows that are drinking less water than other sows. Water is currently a relatively inexpensive input, but this is likely to change in the not too distant future as it is increasingly seen as a limited resource.

## **Quality**

Sulphate is often the main culprit linking poor quality water with poor pig performance. However, most data suggest that levels of sulphate as high as 2,000 ppm have minimal impact on growth performance. However, questions remain.

## **CHECKLIST**

Social vices and other behavioural disturbances in the barn are often a valuable indicator of pig comfort and how well the barn is performing from the pig's perspective. After all, comfort of the barn staff is of course important but how do we evaluate pig comfort. What works for people may not be best for pigs. Examples will be provided.

## **FIBER IN LATE FINISHING**

When feeding diets high in dietary fiber, live pig performance may be somewhat misleading, as pigs fed high fiber diets have lower dressing percentages. Thus a 125 kg pig fed a regular corn-soy diet will be worth more money on the rail due to a higher carcass weight than the same pig fed a diet containing higher fiber ingredients such as DDGS, middlings, etc.

## **MYCOTOXINS**

Mycotoxins can be scary because we do not fully understand how to bring together information on pig performance and assayed levels in the diet. Also, use of binders need to be targeted to specific mycotoxins, as not all binders have efficacy to all mycotoxins.

## **ADDED DIETARY FAT**

Adding dietary fat will almost always improve feed efficiency, and often improves growth rates as well. However, all fats are not equal; how do we compare different fat sources and how do we use them most effectively in the diet. Also, producers must carefully determine the economics of added fat not to pay more in feed cost than the net return.





## PRECISION PIGS – USING BIG DATA

John Van Engelen  
Hog-Tied Farms Ltd

### WHAT WE DO

- 220 Sow farrow to finish farm
- Finished 5500 hogs last year
- Grow, harvest, and make our own feed
- Building new farrow and nursery this spring
- Increasing herd to 350
- Run operations with my two kids
- Enjoy testing, trying, and modifying new products and ideas. Anything that can improve, help, or better farm production

### DATA COLLECTION

I started collecting data 15 years ago on my sorters. Collecting data is just half of the work; analyzing the meaning is the important part:

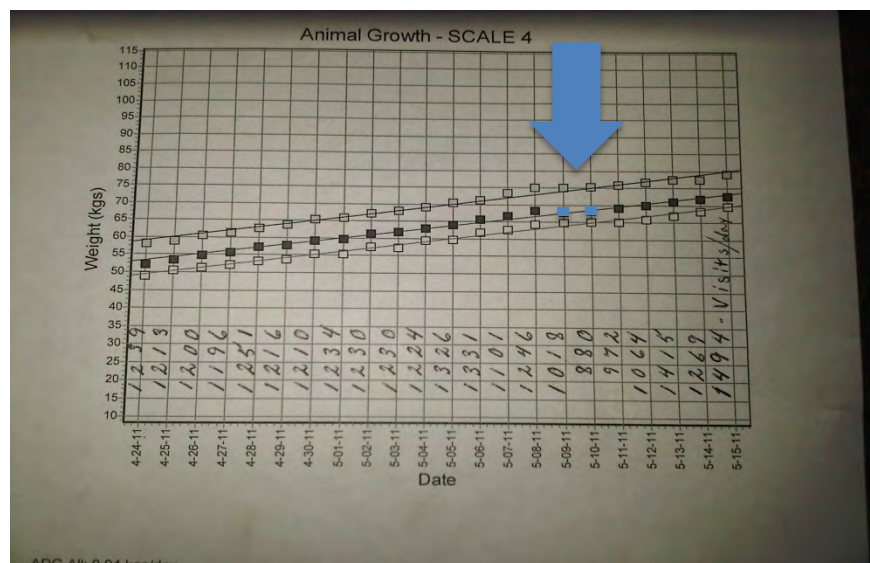
- New products: what is the benefit/Rate of return?
- Goal: Understanding breaking points and cost benefits
- Dissecting huge data set to detect small differences

### IT ALL STARTS WITH FEED

- Precise - ingredients measured by weight for each batch
- Accurately track your costs
- Able to measure and modify based on individual group needs: 12 different feed rations:  
(Big sows, standard sows, 3+ parity sows, gilts, nurse 1, nurse 2, nursery 250, nursery 100, grower 39, finisher 39, finisher 34, finisher 32)

### USING ALL THE DATA

Seeing the slight drop in visits and weight gain, is an indication something is going on. In this case back in 2011, we discovered this sorter room had flu (see Figure).



### **EXAMPLE TRIAL DESIGN:**

- Pigs vaccinated randomly at weaning with a new injectable vaccine to control ileitis
- Pigs selected by weight and gender assigned to one of two treatments : current vaccine protocol (PCV+Myco) vs current vaccine protocol + new vaccine
- Weights collected individually at the end of the hot nursery and at the grow finisher barn by the sorter.
- 35,000 points of data collected at the grow finisher by the scale, on average pigs were weighed daily during 70 days
- A total of 5 weeks of production were included in the study in total 530 pigs included (265 pigs on each treatment)

### **PIG PERFORMANCE TESTER (INSTALLED IN 2013)**

If we were to tag and track each pig, we can monitor intake and growth, and could pick out that costly, poor growing pig, i.e. taking out a pig whose growth is under 800grams/day. By doing this you are cutting your losses, keeping a higher health herd, and using no antibiotics

### **MODIFY AND DISCOVER**

- 2014 noticed low feed intake/slowed growth on PPT
- Tests done on feed showed nothing wrong
- Decided on adding a binder
- Immediate increase in growth and feed intake of pigs on PPT
- Found out the problem was high levels of toxins in the corn

### **LIFT CRATES**

- Our pre weaning mortality rate is 14.3%
- 49.6% account for laid ons
- Lift crates decrease that number by 75%
- If we had all lift crates installed it would decrease our laid ons to 12.4%
- And pre weaning mortality would be 8.98%

### **ESF SOWS**

- First 2 ESF installed 2013, third ESF added 2017, Dual Feed Capability
- Currently using different rations for different sized sows..
- ..with the option for blended feed rations in sows in later stage of gestation
- A daily morning check allows you to see who hasn't eaten yet, and investigate why
- Manage and Sort
- Heat Detection

## **PRECISION PIGS – USING BIG DATA (Part 2)**

**Steve Beadle**

**Engineer, Livestock Structures and Equipment (Sheep & Swine)**

**Ontario Ministry of Agriculture, Food and Rural Affairs**

**120 Main Street East, Ridgetown, Ontario N0P 2C0**

**[steve.beadle@ontario.ca](mailto:steve.beadle@ontario.ca)**

*Note: This workshop includes three speakers. In Part 1 of the workshop, John VanEngelen from Hog-tied Farms Ltd. will discuss some of the technology in his own operation that he uses to assist with management decisions and to trim costs. Tyler Whale from Ontario Agri-Food Technologies discusses data interoperability and how to manage the data collected in Part 3. This discussion constitutes Part 2 of the workshop.*

### **SUMMARY**

Improvements to your operation cannot be made without measurement. We collect data to assess potential changes to our management, equipment or inputs, and use that data to assist with decision making. Increasingly, data is collected using some form of technology. But what happens when the technology we need doesn't exist? Chances are, it does exist in some other industry and can be adapted for our purposes.

### **WHY DO WE COLLECT DATA, AND HOW DO WE COLLECT IT?**

Data collection on the farm is an excellent tool to assist with decision making. Improvements to management, equipment or inputs cannot be made without measuring where we are currently, estimating the effects of changes and measuring the outcomes. Increasingly, some form of technology is used to collect the data we need.

Many producers are already using various pieces of technology in the barn. Electronic feeders, RFID readers and electronic scales are commercially available. Many types of technologies were originally developed for other industries and adapted into the commercial products we have today.

When commercial technology packages tailored to our specific needs are not available, we can look to other industries for existing components and assemble a system that meets our needs.

### **EXAMPLES OF TECHNOLOGY SYSTEMS ASSEMBLED FROM COMPONENT PARTS**

At OMAFRA, we have a number of data collection needs to support our research and extension activities. Many times, our technology solutions consist of a number of components assembled in a do-it-yourself fashion. Resistance to the humid and corrosive environment typically found in livestock and poultry housing facilities requires careful selection of durable components in addition to the primary system measurement objectives. The following sections provide a brief description of a few technology systems assembled to meet our project requirements.

### **Air Quality Sensors**

As part of our barn fire prevention and ventilation system research, we have been monitoring air quality parameters to better characterize the actual gas concentrations in the barn environment. Some of the technology systems selected have been off-the-shelf data loggers with built-in temperature and relative humidity sensors. Others have consisted of data loggers that will accept a milliamp or voltage signal from an external sensor.

Working with a project partner, prototype wireless sensors and a bay station were assembled. The sensors communicate data to the bay station by Wi-Fi while the bay station communicates and stores the data on the Cloud. Data can be accessed by the user on the bay station in the barn, or through a secure internet website from a mobile device or computer. Currently, prototype sensors have been assembled to measure methane and temperature. As funding becomes available, we hope to develop further wireless sensors to measure relative humidity, hydrogen sulfide, carbon dioxide and ammonia. In addition, we hope to integrate the sensors with the ventilation fans to demonstrate automatic gas concentration control in the barn.

### **HotSpot Infrared Scanner**

This demonstration project was developed as part of our barn fire reduction efforts. Working with our project partners, the system includes a camera and infrared sensor mounted in a detector. The detector initially takes photos of the room in which it is installed. The detector then takes many individual readings with the infrared sensor to create an infrared signature for the entire room. The supporting software allows the user to highlight areas of higher risk in the room, increasing the scanning frequency in those areas. Subsequent scans of the room look for changes to the room infrared signature. Is the signature at a particular location increasing in intensity from historical scan data? Has a new localized infrared reading appeared? Has a localized infrared reading moved from its previous location? When a change is detected, the system issues alarms by text or email if pre-set thresholds are exceeded. The system software is Cloud-based and each system has its own secure website accessible from anywhere.

### **Ultrasonic Level Measurement**

As part of our Nutrient Management program, we regularly collect data on manure production volumes to reflect industry changes for estimating manure storage sizing and land base requirements for field application. In the past, much of this data was collected by discrete hand measurement on farm. In an effort to reduce the manpower required to accurately measure manure production, an ultrasonic level measurement system was developed to continuously capture the required data over the production cycle.

The system consists of a robust, sealed ultrasonic sensor mounted in the manure pump out. The sensor is connected to a milliamp data logger mounted on the barn wall in a sealed electrical junction box for quick accessibility. The sensor continuously monitors the liquid level in the storage and the data is recorded at pre-set intervals. The data

logger can store up to 32,000 readings, significantly decreasing manpower requirements and the timing issues associated with discrete hand measurements.

### **Electricity Monitors**

As part of our extension efforts, a review and in-field test of various available electricity monitors was conducted. Most of the products available attach to circuits in the electrical distribution panel and have a number of available channels for multiple circuit monitoring. The electricity monitors provide real-time usage on monitored circuits and record the data on a computer or via a website, depending on the model chosen. Collecting data on electricity usage can assist with management or equipment decisions, to adjust the timing of large draws, select efficient equipment or reduce peak energy demand.

### **TAKE-HOME MESSAGES**

Improvements to your operation cannot be made without measurement. Using technology to collect data can overcome some of the timing restrictions and precision issues associated with discrete hand measurements. When commercial technology packages tailored to our specific needs are not available, we can look to other industries for existing components and assemble a system that meets our needs. With the data we collect, we can make the most informed decisions possible to improve our management practices, equipment and input selections.

### **ACKNOWLEDGEMENTS**

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## PRECISION PIGS - APPLICATIONS OF BIG DATA

**Tyler Whale**

**Ontario Agri-Food Technologies**

[twhale@oaft.org](mailto:twhale@oaft.org)

A workshop with

**John Van Engelen, Hog-Tied Farms and**

**Steve Beadle, Ontario Ministry of Agricultural, Food and Rural Affairs**

### CPAF - ENABLING AGRICULTURE'S DIGITAL TRANSFORMATION

#### Introduction to CPAF

CPAF (Canadian Precision Agri-Food) is the organization driving a vision of Digital Transformation in the Canadian Agri-Food industry through the effective use of data as a resource. Through the development, implementation and operation of open, shared tools and platforms CPAF will enable participants to take advantage of built-in-Canada solutions designed to support them in the highly competitive global economy in which we operate. Designed as a not for profit organization, CPAF will operate its services for the betterment of its participants and members and for the continued advancement of the Canadian Agri-Food industry.

#### Current Initiatives

There are currently two initiatives being executed by CPAF: the Digital Canadian Agri-Food Ecosystem (Digital CAFE) and AgBox.

**Digital CAFE.** Digital CAFE is a data collaboration and application development platform designed to meet specific needs of the Canadian Agri-Food Industry, addressing requirements of all commodities and all members of their end to end value chains. The vision has been developed over a period of three years through hundreds of business needs gathering sessions. At its core, Digital CAFE is a data collaboration environment on which new applications that leverage the integration of disparate data assets across multiple sources can be developed. It does not store or retain data; it enables any to any (and many to many) connectivity of participating members through a unified, open API interface that enables simplified, secure, controlled access to exposed data assets. It also provides an open development environment on which applications and analytics tools can be deployed against these data sources. The result of linking these otherwise isolated data sets is a value multiplier for all participants of unknown/unrealized potential.

We envision Digital CAFE as the data collaboration backbone for the Canadian Agri-Food industry – a data highway system supporting and leveraging the Canadian Agri-Food industry's digital transformation. Participants will be able to access, link to and perform analytics against sources of data otherwise normally outside of their normal business access. The resulting data ecosystem will allow all participants to enhance the value of their offerings to their clients as well as enable development of new products and service offerings to both new and existing clients. It is envisioned that there will be monetization opportunities for the users of Digital CAFE through advanced application development



and data analytics services against the aggregate data source access that will be available to all members of the value chain from producers to distributors and processors. It is not open data, but open, controlled, secure access. Data sharing is subject to contracts and agreements between owners and users.

**Agbox.** An adjunct to Digital CAFE, AgBox, is also in development. AgBox will provide a unified farm data storage cloud aligned specifically to the needs of the producer (raw data owners). Through its connections to Digital CAFE the data stored on AgBox will be transparently accessible by participants subject to the access rights granted by the individual data owners – for data push and pull.

Using examples relevant to the pork industry, the importance of managing and enabling data in a collaborative and permission based, yet open environment will be discussed.

## EARLY PIG CARE: OFF TO THE RACES

Ryan Tenbergen<sup>1</sup> and Ed Metzger<sup>2</sup>

<sup>1</sup>Demeter Services Veterinaires, [rtenbergen@demetersv.com](mailto:rtenbergen@demetersv.com)

<sup>2</sup>South West Ontario Veterinary Services, [emetzger@southwestvets.ca](mailto:emetzger@southwestvets.ca)

The Olympics could have a new sport, and that is early pig life! It is a gruelling few days with intense competition and high demands on its competitors with only the strongest surviving. How do we give piglets the best chance of surviving and thriving as we aim for the gold? It comes down to training, coaching and icing the best team we can (speaking in Canadian terms!).

You may ask, why chose the topic of early pig care? We feel it is important to discuss this because of two very important trends that have emerged in the North American swine industry over the past decade. Data from Swine Management Services based in Nebraska, US, which encompasses production data from over 1.7 million sows in North America, tells us there is a need to consider this topic. We are achieving upwards of 2.88 more pigs born per litter and 6.53 more pigs weaned since 2005, and those upward paths continue to travel on (Ketchum, 2017). These North American statistics mimic what we see in Ontario today as well. Early pig care becomes more important as the number of pigs in a litter climbs; we are asking for higher output with the same real estate! To give these pigs the best chance at survival, we need to optimize all available resources.

But with more piglets, what about pre-weaning mortality? This trend has been different. The top 10% of farms in this category show a downward trend in piglet mortality with an average of 10.2% in 2016, a decrease of 1.9% since 2005 (Ketchum, 2017). However, the SMS database on a whole shows an increase in piglet mortality with an average of 14.3% in 2016, an increase of 1.2% since 2005 (Ketchum, 2017). This tells us that as the top 10% of best performing farms for pre-weaning death loss continue to improve, the overall trend is a negative one. What are these top farms doing differently? We will focus on three aspects of early pig care that must be approached in synchrony to give your pigs the best chance of reaching that finish line. Let us take you on the triathlon that is early pig care!

### 1) THE PLAYERS!

It all starts with the piglet! This is an obvious component to survival in the early days of life. It is no surprise that some pigs are more equipped to deal with these demanding days and end up on the winning side. Our title, “Off to the Races”, was chosen because it suits early pig care very well. It is a sprint to the finish line (weaning) with a full field of competitors and enduring conditions. Below, we describe three important attributes of the piglet to place your focus on in the first 12 hours of life.

#### a. Birth weight

We already highlighted the upward trend in total born we are seeing in North America today. These numbers show no indication of slowing down and are continuing on the same upward trend of the past 12 years. The uterus of the sow only has so much capacity

to carry piglets to birth, and with higher litter sizes, we will encounter decreased average piglet birth weight (Wiegert and Knauer, 2017). These low birth weight piglets are at a greater risk for slow growth and increased mortality rate (Table 1) (Jourquin et al., 2014).

**Table 1.** Impact of low birth weight on survival and growth.

Bodyweight (kg)	% Survival to weaning	Average Daily Gain (g/day)				Days to 100 kg
		Lactation (to 26 days)	Nursery (to 67 days)	Growing (to 110 days)	Finishing (to 157 days)	
Less than 1.13	58	203	293	601	805	191
Equal to and greater than 1.13	92	228	359	659	845	177

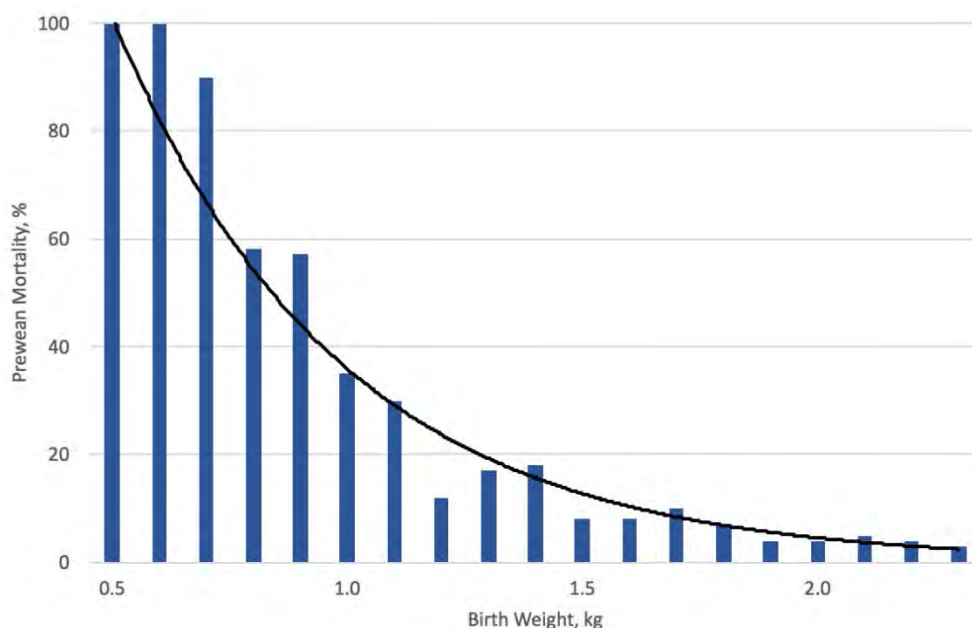
It has been shown and repeated that piglets born with a higher birth weight have an increased chance of surviving to weaning and grow at faster rates (Wiegert and Knauer, 2017; Jourquin et al., 2014; Panzardi et al., 2013; Devillers et al., 2011). In fact, for every 1 lb (or 450 grams) increase in birthweight you can see an increase in weaning weight of 2.8 lbs (or 1.2 kg) (Wiegert and Knauer, 2017). These lower birth weight pigs have been shown to have increased Birth to Nurse Interval (BNI) compared to larger littermates, delaying the ever so important consumption of colostrum, which we will discuss next (Folsnet et al., 2010). Piglets born at 700 grams or less have very little chance of survival without exceptional care as demonstrated by Figure 1 showing pre-weaning mortality rate characterized by birth weight (Jourquin et al., 2014).

These extreme lightweight pigs (<700g) should be considered as candidates for humane euthanasia due to poor prognosis and high likelihood of not only contracting, but also perpetuating, disease.

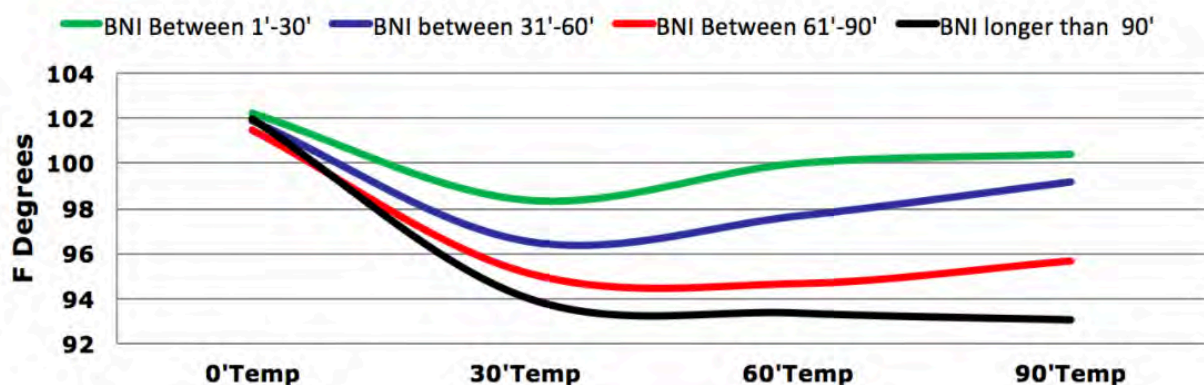
#### **b. Birth-to-nurse interval**

Consumption of high quality colostrum is one of the most important components influencing piglet survival, and it's all about getting off to a quick start! Chilled pigs are one of the biggest reasons for early life death loss. It takes an average of 29 minutes from birth for a piglet to reach the udder and consume colostrum (PIC GTSR). This is a very important number because piglets who reach the udder within 30 minutes of birth show improved body temperature, which is vital for survival in the first day of life (Folsnet et al., 2010). A piglets' ability to regulate body temperature is limited at birth because of their limited body energy reserves, and therefore, the quick ingestion of colostrum

causing an increase in metabolic rate and maintenance of body temperature is very important for survival (Dividich and Noblet, 1983). Figure 2 shows that pigs slower to reach the udder have decreased body temperatures and also recover at a slower rate, if they recover, compared to those pigs faster to reach the udder (PIC GTSR).



**Figure 1.** Predicted pre-weaning mortality by birth weight.



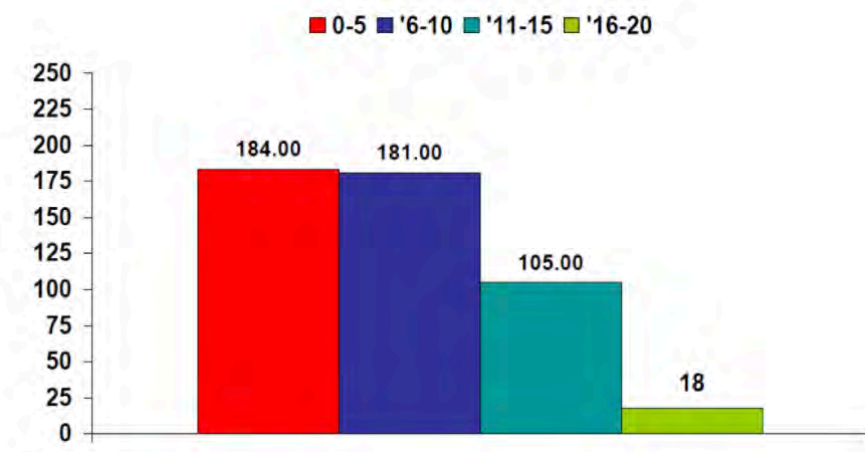
**Figure 2.** Impact of Birth-to-nurse interval (BNI) in minutes on piglet body temperature in the first 90 min of life.

A piglet reaching the udder within the first 30 minutes of life can be as much as 7 degrees Fahrenheit (or 3.9 degrees Celsius) warmer than that piglets that takes longer than 90 min to find the udder (Folsnet et al., 2010). Lower rectal temperature at 24 hours after birth (less than 38.1 degrees Celsius or 100 degrees Fahrenheit) has been shown to be

associated with higher mortality rates in the first week of life and lower weaning weights demonstrating the importance of quick access to a teat shortly after birth (Panzardi et al., 2013).

### c. Colostrum intake

Reaching the udder as fast as they can is a start, but consuming enough colostrum is another hurdle. Colostrum is the first milk produced by the sow rich in energy, protein and immune cells in the first 24 hours after farrowing that is vital to piglet survival. In addition, it contains numerous growth factors and hormones which promote growth and development of the piglet. Pigs that consume more colostrum not only have a better chance of surviving to weaning, but are also heavier at weaning (Devillers et al., 2011), with only a 1 gram increase in colostrum intake resulting in a pig that is 8.8 g heavier at weaning (Wiegert and Knauer, 2017). If we take away human intervention, birth order may have the largest impact on colostrum intake. Piglets require a least 100 ml of colostrum to give them a good chance at survival (Devillers et al., 2011). Figure 3 shows the amount of colostrum consumed in the first day of life by piglets based on birth order (Devillers et al., 2007).

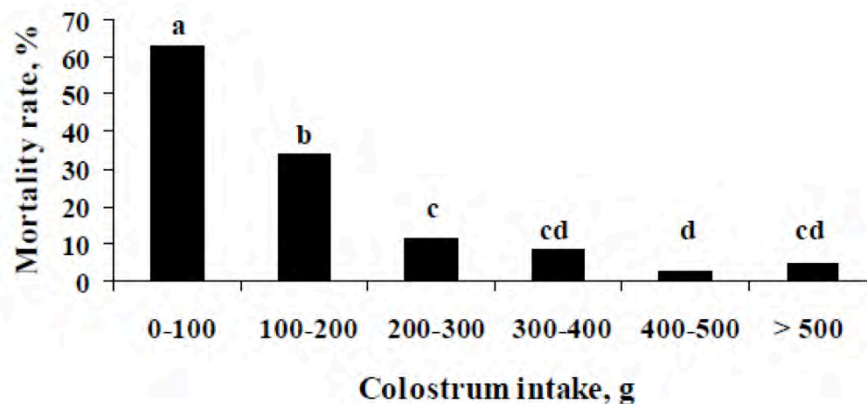


**Figure 3.** Consumption of colostrum (ml) by birth order.

You can see that piglets born from 11<sup>th</sup> to 15<sup>th</sup> consume the minimum amount of colostrum and those piglets born 16<sup>th</sup> and later simply do not and would not survive without human intervention. When we look at colostrum intake and its effects on mortality, you see that over 60% of the piglets consuming less than 100 ml in the first day of life will not survive (Figure 4) (Devillers et al., 2007).

Colostrum is also important to supply the pigs with immune cells they will need to survive the suckling period before their own immune systems develop and mature. Immune cells (antibodies) in colostrum rapidly decline after farrowing. After only 12 hours, the concentrations of all antibody types drops by more than 50% (Klobasa et al., 1987). The

antibodies are important to fight any disease challenges piglets will most certainly encounter while suckling. Pigs with lower antibodies measured after 24 hours of life have been shown to have lower antibodies at weaning, as well as an increased mortality rate before weaning, demonstrating the longer term effects of colostrum intake on piglet growth and survival (Devillers et al., 2011).



**Figure 4.** Colostrum intake and mortality rate.

In summary, there are three important components a piglet needs in the first 12 hours of life for a running start at life:

- i) They need to be born at a viable weight and strong enough to compete with their littermates.
- ii) They need to reach the udder as quickly as possible to consume colostrum and limit their drop in body temperature.
- iii) They need to consume enough colostrum for energy, protein and immune support needed for growth and disease challenges.

## 2) MAMA BEAR!

Our second area of focus again seems intuitive, but warrants discussion and that is the impact of the sow and her ability to mother. We have all seen the negative effects a sow can have on her offspring if she goes off feed for example. This is something we as pork producers understand in a holistic sense, which leads us to ask what can we do to optimize our sows to give the piglets the best chance for success?

To start, we need the right gilt as a quality gilt makes a quality high producing sow with longevity. What do we mean by “the right gilt”? We need a mother that is not only conformationally sound, but also a good mother who can farrow efficiently and produce ample milk for her offspring, and in doing so not completely neglecting her own body condition and health. This process all starts with our gilts, and this holds true whether you purchase replacement stock or have internal replacement.

## **a. Gilts**

How we enter gilts into our breeding herd is extremely important in maintaining a robust sow herd. Proper selection, isolation and acclimation is without question the most efficient way of obtaining healthy, productive replacements. Isolation and acclimation procedures, though not outlined in detail in the presentation due to time constraint, need to be tailored to your particular farm and we would encourage all producers to work with your veterinarian on this process.

A benchmarking parameter that has been getting increased focus in recent years is “gilt retention to P3”. Basically this is a measure of the number of gilts entered into the breeding herd that make it to P3, or third parity. This parameter is an excellent indication of how robust your sow herd is and it starts with the gilt. Gilts that perform poorly are natural candidates for culling, and we can see this trend in Ontario and abroad. You want to aim for 75% or higher of all select gilts entered into your sow system reaching parity three. Why do we use P3 as a baseline you may ask? P3 is often the litter by which amortization breaks even, or simply put that individual sow pays herself off. A sow that is culled following P1 or P2 is very likely to be a money losing sow.

Selection of gilts we will cover in detail below, and this topic is neglected or improperly managed on many farms. To start, we want the gilt to be the right weight and age. These targets have been defined for decades, but are worth revisiting because they can be easily forgotten or missed. We often talk about calendar age of gilts (for example 200+ days of age), but we would propose that chronological or sexual age (for example 2<sup>nd</sup> heat) is equal or more important. History shows there are correlations specifically with weight at first breeding and chronological age, based on the time since first heat (Williams et al., 2005). We want gilts 135-150 kg and bred on their second heat (Amaral et al., 2010). In order to breed on their second heat, we need to be doing two things: intensive boar exposure and proper recording of gilt heats. Working with your veterinarian, strategic use of hormones can be of value in certain situations but not all. Hormone programs can be of benefit but have not been able to replace or outperform aggressive boar exposure and excellent heat checking ability.

Lastly, gilts on arrival need to have adequate numbers of teats. In our opening slides we showed farms who are approaching 15 total born/sow. How can we possibly expect a sow to milk 14-15 piglets if she only has 12 usable teats? Whether you are buying in select gilts or growing your own replacements, teat selection is very important. It is very possible for even select gilts to arrive at your farm with “blind teats” or simply insufficient numbers of teats. An example of an inadequate underline is shown on Figure 5.

Checking gilts for adequate teat numbers is not an easy task; they are often hard to see and time consuming to count. That said, we want to have 14 available and functional teats for every gilt that farrows and we will not achieve this target without counting and monitoring. We cannot biologically ask a gilt with 12 teats to wean 14 thriving pigs; there simply is not enough groceries.



**Figure 5.** The underline of a gilt. This developing gilt only appears to have 6 functional teats.

#### **b. Feeding the sow**

The second area of focus for us is making sure we feed our sows properly to set them up for lactation success. Full disclaimer for everyone, we are veterinarians not nutritionists. When it comes to sow feeding it is absolutely best to consult with your feed supplier, their nutritionists and feed salesmen. We are blessed in Ontario to have such a wide variety of feed suppliers and we would encourage everyone to continue to use this valuable resource. That said, all I want to emphasize is the importance of stepping up feeding as you move farther along in lactation. Overfeeding and underfeeding are both problematic.

Also, when it comes to feeding, it is important to have a plan in place for off feed sows. As many of you know, sows who go off feed can deteriorate very rapidly, and this can manifest in low milking ability and weak, unthrifty piglets. Discuss with your veterinarian what are you doing with these sows, when are we treating them and with what, and when do we foster off those piglets in cases with poor prognosis.



### **c. Sow Body Condition**

Sow body condition is a game of moderation, and it can be thought about in that context across all species. Even for humans, anorexia or lack of nutrition can be devastating to health, and on the contrary, clearly obesity can be equally detrimental.

The same theory can be applied to sows. At the time of farrowing, being too skinny or too fat are both troublesome. The goal is to maintain adequate body condition to meet the needs of the progeny, and yet not be over conditioned to the point it is self-limiting. Keep in mind all sows lose condition in farrowing – it is impossible for sows to eat enough nutrients to sustain their weight while lactating.

Over conditioned sows will have decreased mammary development, reduced feed intake in lactation, and moreover added expense in extra unneeded growth. Fat sows also are harder to farrow if there is extra fat deposition in the pelvis. On the contrary, thin sows will have reduced reproductive performance and increased sow mortality. These sows ultimately exhaust sooner, and can be more prone to retained pigs/stillbirths, etc., due to exhaustion (Kim et al., 2015). Using common sow conditioning scoring systems, producers can try and analyze the true degree of body condition variance in their herds. Back fat scoring sows also shows promise in aiding and homogenizing sow body condition.

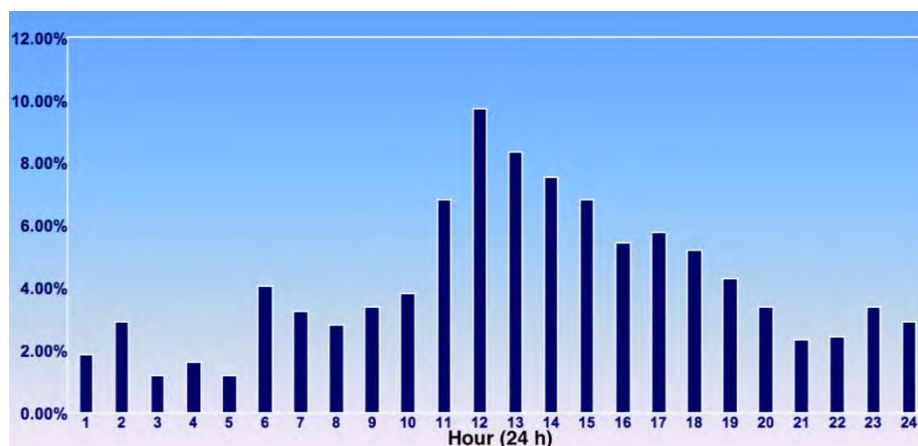
### **3) THE COACH!**

Our last focus in producing Olympic ready-pigs is the need for excellent coaching. In the case of pig production, we, the barn staff and stockmen/women, are the coaches. People are the driving force of an operation, plain and simple. We, as coaches, have the ability to level the playing field and provide every pig with the best chance of finishing the event of weaning. Early pig care is vital to all competitors reaching the finish line and, in the end, people can maximize the profitability of your farm.

#### **a. Labour force**

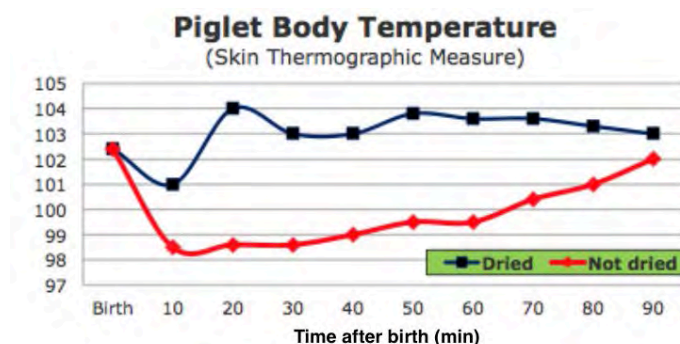
When we talk about early pig care, nothing beats the availability of human intervention if you want to maximize your farm's full potential. Monitoring and assisting farrowings is the most important job in a farrowing house. We want to provide appropriate assistance to those sows and piglets that need it during this critical time, but there are only so many work hours in a day! How can we maximize people available during farrowings? Figure 6 shows the distribution on a 2700-sow farm in the U.S. with 24 hour monitoring (Ketchum, 2017).

You can see a trend in when sows farrow on this farm. Sixty percent (60%) of sows farrow between 11am and 6pm (7 total hours). We would not expect this trend to be the same in every farm across North America, but we encourage you to record farrowing times and build a database to allow you to better focus your attention and people when it is most needed. This farm had 87.9% of sows farrow between 5am and 10pm (18 total hours). Can you adjust staff hours to increase your chances of someone being present when sows are farrowing?



**Figure 6.** Distribution of farrowings (% of total) by hour of day.

The idea of monitoring farrowings and providing assistance to sows has one end goal, more live piglets. So why would you not focus on the end goal and ensure the newborn piglets have the best start at life. Drying piglets after birth is something that takes 20-30 seconds of time with huge benefits for the pig. Ensuring this gets done will limit the body temperature drop piglets experience in the first 90 min of life (Figure 7) (Morales et al., 2010).



**Figure 7.** Body temperature (degrees Fahrenheit) of pigs dried and not dried after birth.

You can see the rapid decline just 10 minutes after birth piglets experience when not dried compared to when dried, and the slow return to normal range of those pigs that are not dried after birth. We have already discussed the effects that lower body temperatures at 24 hours after birth have with higher mortality rates and lower weaning weights (Panzardi et al., 2013). Chilled pigs spend more of their valuable and limited energy reserves for thermoregulation rather than competing and finding a teat to consume the colostrum they need. Drying piglets also provides the opportunity to place piglets on a teat immediately after birth reducing their birth-to-nurse interval and allowing more time for consumption of high quality colostrum reducing mortality rates,

improving immune cell transfer from the sow and improving growth to weaning. All of these benefits from 20-30 seconds of your time!

Now that we have dried and placed each piglet on a teat, how do we deal with the 14.2 average of total born pigs in North America (Ketchum, 2017)? Split suckling is a strategy that can be used to improve colostrum intake of small, low viable pigs or pigs born late in the birth order because we know these pigs have less chance of adequate intake (Devillers et al., 2007).



**Figure 8.** Simple plastic hoop for split suckling.

We want to start split suckling as soon as farrowing is complete and it is most important in the first 12 hours after birth when colostrum is rich in protein and immune cells the piglet needs (Klobasa et al., 1987). This ensures each piglet gets the colostrum they need for the best chance of survival.

## **b) Processing**

When it comes to processing, it's about getting the little things right! Processing will encompass a number of procedures (farm-dependent), which include needle teeth clipping, tail-docking, castration of boars, an iron injection, potentially an antibiotic injection, and as of July 2016, pain relief. This process starts right from the moment you pick up that pig until the time you set it down. What can we do as stock people to ease this process? This is a stressful event for a piglet! Ask yourself, why are we doing each step, and if you can't remember the answer, it may be time to revisit the process.

One of the most important jobs of processing neonatal pigs is to provide them with iron, something wild pigs would normally receive from the environment when born outdoors. The reason is to prevent anemia, or low red blood cell counts, in the newborn pigs. The topic of anemia and iron supplementation has received increased focus in the last couple of years. There are concerns that, given the dramatic advancements that have been made in the genetic potential for piglet growth, we may be in a position where our

standard iron supplementation protocols are inadequate and that iron deficiency anemia could be a driver of reduced performance in suckling and weaned pigs. A group at the Ontario Veterinary College (OVC) Swine Research cluster investigated this hypothesis and published a study in 2016. Of the 20 farms they sampled in Ontario, almost all had evidence of anemia, and furthermore, anemic piglets were on average 0.82kg lighter at 3 weeks post-weaning (Perri et al., 2015). They also found a potential link between higher zinc oxide supplementation and anemia. What this tells us is that it is certainly possible that traditional approaches to iron supplementation may be inadequate as theorized. However, it is clear that this does vary by farm. We would suggest discussing iron supplementation with your veterinarian because iron deficiency anemia is something we can measure and titrate and there have been farms in Ontario experimenting with different approaches. Unfortunately, there is limited recent research studies comparing various methods of supplementation, but stay tuned! For the producers, keep in mind the answer is not necessarily just give more as toxicity is possible when giving too much at one time.

Have you always clipped needle teeth? If so, what's the rationale? In Ontario, we certainly have producers who clip needle teeth out of necessity due to their particular health status. That said, some producers clipping teeth might not need to, or don't need to as much. When you clip, are you clipping to the right length? If there is blood, you cut too deep! Cutting teeth too deep exposes entry to the bloodstream allowing bacteria the opportunity to compromise pig health. Do you record the number of times this happens? Most producers don't, and you can't analyze what you don't measure!

Same theory applies to tail docking. Is your docking length adequate to reduce downstream tail biting? On the contrary, clipping tails too short can have its own negative effects through neural damage at the tail head leading to tail laxity and increased chance of bacterial infection.

With regards to antibiotic use, the approach of an antibiotic with iron is extremely common in Ontario to prevent common bacterial pathogens or post-castration injection site infections. We won't delve into the thought process of antibiotic selection or whether to forgo altogether, but we do find it surprising how often iron and various antibiotics are mixed incorrectly and at the wrong dosages. Antibiotic at half strength is of little value, and on the other hand, double strength is a risk for resistance and that excess antibiotic could displace what should have otherwise been iron. Keep in mind that the University of Guelph has also shown that meloxicam, used for pain relief, will degrade rapidly in the presence of iron and this should be considered when discussing your pain relief options for castration and tail-docking of piglets (Prairie Swine Center, 2015).

### **c) Oxytocin Use**

Oxytocin is a naturally occurring hormone, which when produced naturally in the body, is responsible for increasing milk let-down and promoting smooth muscle contractions. These smooth muscle contractions occur in the uterus amongst other areas of the body, and these uterine contractions are the main reason this hormone gets used. Overuse of oxytocin can have detrimental effects, and thus should be used only when needed.

Overuse of oxytocin is known to cause an increase in stillborn pigs, likely a result of premature umbilical cord rupture in utero (Linneen et al., 2005). In order to ensure you are using oxytocin properly, consider some of the following recommendations:

- i. Administer oxytocin only after the cervix has dilated. How do you know this? If you sleeve a sow and you cannot enter fully with your arm, it is very likely the cervix is not opened yet.
- ii. Do not administer oxytocin to animals that you have not sleeved. If a piglet is stuck in the birth canal and you are not aware prior to administering oxytocin, it can potentially lead to rupture of the sow's uterus due to extreme contractions. In fact, sleeving a sow will cause natural contractions and may limit the need for oxytocin altogether.
- iii. Only administer oxytocin to sows who have had 40 minutes or greater since they farrowed their last piglet.
- iv. Ideally, target oxytocin to gilt litters as much as possible. Also, aim to give oxytocin towards the end of the farrowing process, or after at least 6 piglets have been born.

## CONCLUSIONS

We have shown that early pig care is a combination of three factors that work together in synchrony: 1) the piglet, 2) the sow, and 3) the people. Piglets are born into a competitive environment with high demands and you, the herdsman and herdsman, can help improve their chances of survival and profitability of your farm. Although an Olympic triathlon, as we have compared early pig care to, is a test of endurance, getting your pigs "off to the races" with the quickest start to the race will improve their odds of crossing the finishing line!

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**VALUE CHAIN PROGRAMS -  
EXPLORING NICHE/SPECIALIZED MARKET OPPORTUNITIES**

Heather Ferguson<sup>1</sup> and Brett Israel<sup>2</sup>

<sup>1</sup>Value Chain Manager, True Foods  
151 Savage Dr. Cambridge ON, N1T 1S6  
[heather.ferguson@TrueFoods.ca](mailto:heather.ferguson@TrueFoods.ca)

<sup>2</sup>Carl Israel Farms Limited  
RWA/Organic/ GAP Pork Producer  
[decabrett@gmail.com](mailto:decabrett@gmail.com)

**ABSTRACT**

This is an interactive workshop that outlines various pork niche value chains and issues/opportunities that surround them. Planned topics include the ones listed below and include direct producer experiences.

**Producer Profile:**

Carl Israel Farms Limited

- Three generations farming together (six generation farming history)
- 180 sow Farrow to Finish
- RWA 2+ years
- Transitioning to Organic + GAP 1 production
- New build - 46,000 sq. ft. Farrow to Finish barn

**TOPICS FOR DISCUSSION:**

**WHAT ARE NICHE/SPECIALIZED MARKETS?**

- The changing structure of the swine industry has fostered the creation of new markets and interest by swine producers in considering alternatives to the traditional commodity system
- Production with special attributes or limitations
- An opportunity to provide food companies with a menu of label claims for their branded grocery & restaurant products

**WHAT ARE VALUE CHAINS?**

- A value chain can be defined as an alliance of enterprises collaborating vertically to achieve a more rewarding position in the marketplace
- Multiple Possibilities for Marketing



## CONVENTIONAL VS NICHE MARKET VALUE CHAIN PRODUCTION

- Why not educate the consumer that conventional production is good?
  - Mindset Change
  - Why not produce what consumers want?
- Canadian packers/processors are still focused on commodity primarily
  - If pork is channeled through larger abattoirs and traditional markets, it is practically impossible to know where it came from. However, other smaller markets that allow traceability exist for all farmers.
- Canadian defense vs. offense approach
- Producers have been commodity focused but seeing a shift in medium & larger pork producers

## BENEFITS OF PRODUCING FOR NICHE MARKETS VALUE CHAINS

- Believe in the ethos of the program
  - Values as an enterprise are in line with these programs
- Scalability of current facility
  - Well suited for smaller scale family farming operations
- Business Plan Modeling
  - Compete on margins not volume, fundamental business strategy
  - Premiums
- Guaranteed Kill Space
- Provides opportunity to move with consumer trends
  - Provide them with a product that they want?
- Better relationships with buyers, less demonization of the industry

## DO YOUR HOMEWORK - FAILING TO PREPARE IS PREPARING TO FAIL

- Know your standards and how to interpret them
  - Talk to other producers
  - Tour barns (if possible)
- Know how you will be verified
  - Auditing (How many audits? Who pays? Who schedules?)
  - Training documentation
- Know your costs
  - Renovations
  - Increased feed costs (availability of ingredients)
- Document Management
  - Need to be comfortable with standards and lots of paperwork
- Know your current issues
- Most important step, have to gather as much knowledge as possible
- Complete SWOT analysis- **Group Activity**

## RENOVATIONS

- Retrofit
  - Repurpose what you can
  - There is potential in almost any space, but at what cost?
- New Build
  - Know your specifications
  - Network with other producers to find what works well and what does not
- **Producer Profile**
  - Review of example renovations on a bank barn to meet organic standards
  - Go through the layout of new barn construction
- **Group Activity** - Discussion with participants regarding their barn layouts and what could work
- Importance of finding and working with a builder that is experienced

## FINANCING/ BUSINESS PLANS

- Most important step aside from doing homework
- Key to getting financing, and convincing less than supportive business partners
- **Producer Profile**
  - Walk through business plan and financing breakdown

## NUTRITION

- Working with a nutrition partner that has knowledge and experience in value chains is imperative.
  - Nutrition company needs to know what is allowable and what is prohibited
  - Nutrition company should act as a liaison in the event of CFIA/CB on ingredient issues
  - Continual research on tools to help production
  - Diet and ingredient detailed analysis
- Efficiencies
- **Producer Profile**
  - Pick the right partner
  - Nutrition can cause a lot of good or create problems if not balanced properly
  - In organic system, great synergy found by growing input crops
  - Feed the soil to feed the crops to feed the pigs

## GENETIC SELECTION

- Need to understand that genetic selection is critical to success, hedge risk of challenges that these growing conditions can bring
- **Producer Profile**
  - Our strategy is to pick a work horse, not a race horse
  - Need to be resilient

**Group Activity** – breed and trait discussion



## **TROUBLE SHOOTING REPRODUCTIVE ISSUES**

**Jennifer Patterson and George Foxcroft**  
**Swine Research & Technology Centre**  
**University of Alberta, Edmonton, Alberta, T6H 2V8**  
[jennifer.patterson@ualberta.ca](mailto:jennifer.patterson@ualberta.ca)

### **ABSTRACT**

Reproductive issues can be difficult to trouble shoot and diagnose as many contributing factors may be involved. Reproductive issues can range from poor retention of gilts through the selection program, poor response to boar exposure, failure to meet breeding targets, low first litter size, poor sow lifetime productivity and variable sow retention. Although existing production record systems provide reliable data with which to determine variable performance in the established breeding herd, measures of good gilt management (birth to first service) is largely overlooked in routine record keeping and cannot therefore be considered as a key contributing factor when trouble shooting reproductive issues later in the production cycle. This paper will focus on gilt management as the foundation of good sow herd performance and is based on the premise that measuring and managing the key components of successful gilt replacement program will substantially reduce reproductive issues reported in the sow herd.

### **INTRODUCTION**

One of the most critical factors driving the reproductive performance of the sow herd is gilt development and management. Gilts are the foundation of good production (Tubbs, 2015) and drive farm success (Ketchem and Rix, 2015). Gilts with the greatest potential lifetime productivity can be identified through the implementation of successful gilt management programs. However, successful replacement gilt management starts at birth and continues until first service, and the management practices implemented will influence gilt performance and thus the future performance of the herd. The monitoring of the gilt selection program must necessarily also cover the birth to first service interval.

A good gilt management program will monitor and manage the following key components:

- Litter of origin as a key benchmark of selection potential (gilt birth weight and birth weight phenotype)
- Appropriate retention criteria through the pre-selection program
- A final selection program that identifies the most fertile gilts that also meet body weight targets for breeding
- A program that provides a consistent supply of service eligible gilts
- Appropriate management of both weight and a positive metabolic state at breeding

Troubleshooting suboptimal reproductive performance within a gilt replacement program can still be difficult as many factors contribute to the success of the program such as the efficacy of the “boar effect”, the inherent responsiveness of individual gilts, dynamic changes in growth and health status and environmental effects. Table 1 provides a list of

some of the potential reproductive issues that may be linked directly back to failure to address key components of good gilt development unit (GDU) management.

**Table 1.** Common reproductive issues that may arise as a result of failure to address the key components of good GDU management.

<b>***Failure to identify reproductive issues in a timely manner.***</b>			
<b>Low Individual Birth Weight/Low Litter Birth Weight phenotype</b>	<b>Failure to maintain a consistent supply of service eligible gilts</b>	<b>Failure to select the most fertile gilts</b>	<b>Inappropriate management of body state at breeding</b>
High pre-weaning mortality.	Delayed onset of estrus.	Poor retention to 3 <sup>rd</sup> parity.	
Low retention of gilts through selection program.		Poor lifetime production.	
Low efficiency of replacement gilt production	Poor response to boar exposure.		Poor performance in 1 <sup>st</sup> lactation.
	Services per week not met.	High replacement rate.	
	Poor synchrony of first estrus among gilts.	Low first litter size.	
Poor growth performance of low birth weight progeny.	Late return to estrus after 1 <sup>st</sup> weaning		
	Gilts are too heavy, too old at puberty.		
	High non-productive days.		

### **IDENTIFYING REPRODUCTIVE ISSUES IN A TIMELY MANNER.**

The detection of reproductive problems depends on the observational ability of the producer, regular recording and entry of reproductive events into the farm database and thorough production record monitoring and analysis (Evans et al., 2006). Large amounts of data are collected and recorded on a daily basis, if used correctly and efficiently, they can be used to provide powerful insight to track and monitor reproductive success and to make data-driven decisions that will positively affect overall herd performance. Unfortunately, in the case of the replacement gilt the necessary data is often not collected and/or analyzed: As the saying goes “if you don’t measure it, you can’t manage it”. The benefits of data-driven decision making have been demonstrated conclusively (Provost and Fawcett, 2003), across many industries, and producers that implement these strategies in their systems will have a competitive advantage. By identifying and removing unfavourable replacement gilt traits early, decisive action can be taken to minimize the negative impact of poor GDU management on lifetime reproductive performance.

There are numerous examples where data recording, analysis and reporting at all levels of replacement gilt management would be beneficial in trouble shooting the resulting reproductive issues shown in Table 1. For example, particularly in a commercial multiplication program, records of litter size, sex-ratio and birth weight would identify

sows that repeatedly display the low birth weight (LBW) phenotype at the nucleus level. This would allow producers to selectively cull extreme LBW phenotype sows that make a very limited contribution to the gilt replacement program and to apply management interventions to individual lower birth weight gilts to improve their pre-weaning survival and growth. During the stimulation and detection phase (Table 2) daily monitoring and recording signs of estrus and the critical Heat-No-Serve event are critical in differentiating “Select” from “Non-Select” gilts and for the proper use of PG600 to induce pubertal estrus in known non-cyclic “opportunity” gilts. Recording weight at puberty is essential if gilts are to be effectively managed to achieve target weights at first service. Each of these measured and managed components of the GDU program have direct benefits in improving lifetime performance and help avoid much of the later trouble shooting of poor sow performance.

Having established that measuring and managing all stages of the gilt replacement program will have benefits to overall breeding herd performance, the next essential step is to recognize the key risk factors limiting gilt potential.

## **RISK FACTORS FOR RETENTION THROUGH THE GILT SELECTION PROGRAM**

### **Low Individual Birth Weight/Low Litter Birth Weight Phenotype**

**Low birth weight.** As a consequence of genetic selection increasing litter size, the industry has seen an associated increase in within-litter variation in birth weight and an increase in the proportion of piglets with low birth-weight (Yuan et al., 2015). Within-litter variation can be attributed to, but not limited to, factors such as duration of ovulation and oocyte maturation, the implantation capability of conceptuses and position within the uterus, placental efficiency, uterine space, breed differences (Yuan et al., 2015) and intrauterine growth retardation. In the current literature, there is general consensus that the low birth weight gilts within a litter are at risk. Gilts weighing less than 1.0 kg at birth have increased pre-weaning mortality and little chance of surviving until weaning (Magnabosco et al., 2015). Those gilts that do survive past the nursery phase have poor growth until finishing and are significantly lighter than their higher birth weight littermates. Additionally, as future replacement females, low birth weights negatively impact their reproductive potential. Flowers (2015) suggested that below a minimum birth weight of 1.1 kg, gilts simply do not have the reproductive machinery to be efficient reproductively, no matter how well they are managed later in life. In gilts, the variation in birth weight is negatively correlated to ovarian and uterine development (Deligeorgis et al., 1984). Although Almeida et al. (2015) subsequently reported that birthweight does not affect the development of the genital tract before puberty and age at puberty onset, more recently, Magnabosco et al. (2016) reported that gilts weighing less than 1.0 kg at birth, and still selected as replacements at 170 days of age, produced fewer pigs over three parities and remained in the herd for less time.

Post-farrowing management (day 1 care) is essential to better manage low birth weight pigs. Drying piglets immediately after birth and placing them under a heat lamp will significantly reduce piglet mortality (Andersen et al., 2008). Ensuring adequate colostrum intake provides essential nutritive and protective support to newborns as they transition

from prenatal to postnatal life and promotes normal uterine development within the first two days of life (Bartol et al., 2014). Lack of colostrum intake could potentially negatively impact reproductive performance as adults. Strategic cross fostering, involving a reduction of the litter size in which replacement females are raised, is a management technique that has been shown to significantly increase sow longevity, improve farrowing rate, and tended to increase number of pigs born over 6 parities (Flowers, 2015). A reduction in nursery competition may increase overall growth and enhance early development of reproductive organs. Furthermore, replacement gilts raised in the small litters were heavier at weaning and maintained a significant weight advantage throughout the rest of their productive lifetime, compared with their counterparts from large litters.

**Low birth weight phenotype.** A “low litter birth weight” (LBW) phenotype at the multiplication level carries all the same risks described above for individual low birth weight gilts but as a “litter” trait. The low average litter birth weight phenotype in these sows is reported to be related to a hidden prolificacy trait, arising from the interactions between ovulation rate and the dynamics of embryonic and early fetal survival (factors that determine litter size *in utero* in early gestation) and placental function and uterine capacity (factors that affect prenatal development) (Patterson and Foxcroft., 2016). In any population, sows can be identified that consistently exhibit the “low” birthweight phenotype over consecutive parities, irrespective of the total number of pigs born. Therefore, litter average birth weight is repeatable, and thus predictable, within sows. Sows that exhibit the low birth weight phenotype at the multiplication level will produce progeny with limited survivability after birth, compromised growth potential, and overall will have a low efficiency of replacement gilt production. If gilts from these sows do end up in the breeding program, they will in turn pass on this low birth weight trait to their commercial progeny (Patterson and Foxcroft, 2017).

The ability to predict a sow’s litter birth weight phenotype is important and has considerable ramifications on the efficiency of replacement gilt production and on the SLP of gilts produced. Identifying sows that repeatedly display the LBW phenotype allows producers to selectively apply relevant management interventions. In the most extreme LBW phenotype (bottom 15%), Smit et al. (2013) reported that no nucleus/multiplication sows first giving birth to a LBW litter produced a high birth weight litter at a subsequent farrowing. We have more recently presented preliminary results confirming the repeatability of the most extreme LBW phenotype at production nucleus/multiplication level (Patterson and Foxcroft, 2016, 2017). Producers can, therefore, effectively select against extreme LBW sows without risking missing out on high quality litters born in later parities and thereby minimize the number of LBW sows in the nucleus/multiplication herd. This will increase the efficiency of replacement gilt production and also to reduce the risk of passing this unfavourable trait to the downstream commercial units.

## **FAILURE TO SELECT THE MOST FERTILE GILTS**

Successful gilt introduction and retention through the early parities drives lifetime performance of the breeding herd. This represents an under-appreciated opportunity to

improve and enhance overall production. The response to boar stimulation effectively identifies more productive gilts. When boar exposure is limited to a pre-established window of time, earlier maturing gilts are identified and producers can take advantage of the link between early sexual maturity and improved SLP (Patterson et al., 2016). We recommend that gilts that are naturally cyclic within a defined number of days (30 days) after boar exposure are considered to be the premium “Select” gilt population: All others are considered “opportunity” gilts and are only entered into the herd if breeding targets cannot be met from the “premium” Select pool. However, when daily boar stimulation was provided for longer periods, approximately 95% of gilts reached puberty after 60 days (Kummer et al., 2009). Similarly, in a more recent study by Calderón Díaz et al. (2015), gilts first starting boar exposure at 160 days of age were allowed a maximum of 100 days to reach puberty, and a total of 94.2% of gilts responded to boar exposure. Within this same population of gilts, Vallet et al. (2015) identified a population of gilts that take longer to respond to boar exposure and suggested that these later responding gilts likely have a reduced rate of remaining in the breeding herd to later parities and that strategies to incorporate them into the breeding herd should be avoided (considered Non-Select) (Vallet et al., 2015). Similar links between delayed onset of pubertal estrus and poorer reproductive performance over three parities was reported previously (Patterson et al., 2010).

There is consensus in the literature that Non-Select “opportunity” gilts will have compromised performance compared to “Select” gilts. Select gilts are inseminated earlier and have fewer NPD, are culled less due to reproductive problems, have higher farrowing rate, have more pigs born alive and longer reproductive life, and are culled later (Schukken et al., 1994; Sterning et al., 1998; Koketsu et al., 1999; Patterson et al., 2010; Saito et al. 2011, Kaneko and Koketsu, 2012, Roongsitthichai et al., 2013). In addition, estrus characteristics at puberty are predictive of future performance: Sows with stronger estrus symptoms (length and strength of the standing reflex) are more likely to farrow (Knauer et al., 2012) and gilts with stronger vulvar signs at puberty are related to stronger vulvar signs after first weaning (Sterning et al., 1998). *Thus, identifying early maturing gilts will result in improved sow lifetime productivity.*

## **FAILURE TO MAINTAIN A CONSISTENT SUPPLY OF SERVICE ELIGIBLE GILTS**

Implementation of an effective GDU system is absolutely necessary and is the pivotal starting point to select gilts with the greatest reproductive potential. An example of a gilt development protocol is shown in Table 2. The GDU protocol can be divided into two 28-day periods, comprising pre-stimulation management followed by an aggressive but limited stimulation program. During pre-stimulation, routine procedures such as vaccinations, sorting and tagging are completed, and this phase may coincide with periods of isolation and/or acclimatization. It also may be beneficial to have daily alley-way contact with boars during this pre-stimulation period.

During the stimulation phase, puberty stimulation and detection are the primary focus. One of the key factors in the success of this phase is the quality and effective use of boar-derived stimuli. Boar libido is a critical factor influencing puberty attainment in gilts and



daily exposures to a rotation of mature, high libido, boars maximizes the response to this component of the “boar effect”. Patterson et al. (2002) reported that direct boar contact is better (an average of 10 less days to get a pubertal response) than fenceline contact, and that taking the gilts to the boars is more effective compared to taking the boar to the gilts pen (a higher total percentage of gilts reaching puberty). Taking these principles into account, a “Boar Exposure Area” (BEAR) was developed to for use in the GDU.

As shown in Table 2, during the stimulation and detection phase, gilts are subjected to daily fenceline and direct exposure to mature boars for the stimulation and detection of puberty. Daily records of impending estrus (progressive vulval changes and behavioural observations of soliciting by the gilt) are recorded. As gilts exhibit their pubertal estrus, confirmed by the back-pressure test, they are weighed and designated to be bred at second or third estrus to achieve target breeding weights. After 23 days of daily stimulation, if there are not enough gilts cycling to meet breeding targets, eligible gilts (known non-cyclic, adequate growth rate) are treated with PG600. PG600 is only administered to gilts that are known non-cyclic as confirmed by heat-check records. Gilts are given daily exposure to boars for an additional 7 days, after which all non-cyclic gilts are considered to be unsuitable to become a breeding female and are culled.

**Table 2.** An example of a gilt development unit protocol.

<b>PRE-STIMULATION</b>		
<b>Period 1</b> <b>28 days</b>	<b>Week 1</b>	Tagging, tattooing, vaccinations, etc.
	<b>Week 2-4</b>	Daily fenceline/alleyway exposure to boars.
<b>STIMULATION &amp; DETECTION</b>		
<b>Period 2</b> <b>28 days</b>	<b>Day 1-28</b>	On a daily basis gilts receive daily direct boar contact in a purpose built BEAR unit for a minimum of 10-15 minutes per day.
		Daily records of signs of estrus on a 3-5 point scale are recorded.
		As gilts exhibit the standing reflex, a scale or a weight tape is used to measure body weight to predict target breeding weight.
	<b>Day 13</b>	Any gilts that have not expressed estrus are re-mixed into a new pen group for further stimulation of pubertal estrus.
	<b>Day 23-24</b>	If there are not enough gilts cycling to meet breeding targets, eligible gilts (known non-cyclic, adequate growth rate) are to be treated with PG600.
	<b>Day 23-28</b>	After PG600 injection gilts are subjected to daily, direct boar contact for stimulation of estrus.
	<b>Day 28</b>	28 days after initial exposure to the boar, all cyclic gilts are relocated to the sow barn.
		On a daily basis gilts receive daily direct boar contact in a purpose built BEAR unit for a minimum of 10-15 minutes per day.

On a fill by fill basis, variation exists in the response to boar exposure, the proportion of gilts naturally cyclic and the proportion of gilts needing to be treated with PG600. This represents normal variation in the response to boar exposure and could be due to factors including season/temperature, growth rates, disease/health status, and various management or boar factors. However, the number of gilts available to meet breeding targets remains consistent and only gilts with a recorded HNS event are eligible to be bred. By implementing standardized GDU protocols, predictable numbers of high-quality breeding-eligible gilts can be delivered to the sow herd. Patterson et al. (2016) reported that PG600 is an essential tool in the GDU, and although minimal differences in lifetime productivity between naturally cyclic and PG600-induced gilts were detected, it was offset by the minimal number of gilt NPB accumulated and the excellent overall retention of gilts in the breeding herd.

### **INAPPROPRIATE BODY STATE AT BREEDING**

**Weight.** Results from experimental studies and cost/benefit analyses suggest that gilts should be bred at a target weight of 135 to 150 kg (300 to 350 lbs). According to Williams et al. (2005) gilts weighing less than 135-140 kg have less total pigs born over 3 parities than gilts weighing over 135 kg. Amaral Filha, et al. (2010) reported that gilts bred >170 kg were at risk of low retention and locomotion problems over 3 parities. Also, heavy gilts at 1st service, tend to be heavy at a farrowing and have more demands for maintenance (Bortolozzo et al., 2009) and heavy gilts during gestation and lactation where reported to achieve less than optimal productivity and feed utilization (Kim et al., 2016).

To meet these critical targets for breeding weight, information on gilt weight and growth rate is one of the key non-negotiables of effective GDU management. We recommend that including a weigh scale or using a weigh tape within the GDU become obligatory from both a management and welfare perspective.

**Estrus.** More important than chronological age at mating (a function of management practices), is physiological age (number of estrous cycles). Early stimulation of gilts permits producers to take advantage of the increased productivity of gilts bred at second or third estrus. Kummer (2005) reported an increase (statistically non-significant) of 1.5 total born for those gilts bred at similar ages and weight, but bred at 1<sup>st</sup> or 2<sup>nd</sup> estrus. There was a marginal increase of 0.4 and 0.3 total born breeding gilts at 3<sup>rd</sup> or 4<sup>th</sup> estrus.

**Age.** Breeding on the basis of age alone is considered to be inappropriate and an inadequate benchmark. Gilts reaching puberty over forty days of boar stimulation may have up to 60 days variance in age at puberty, a 75 kg variation in body weight at first estrus, and the need to breed gilts at anywhere from 1<sup>st</sup> to 6<sup>th</sup> estrus if breeding weight targets of 130 to 150 kg (300 to 350 lbs) were to be met. Speaking generally, when age is used as an expression for body weight, Pinilla and Leczenieski (2010) reported gilts should be bred less than 32 weeks to meet weight targets.

**Growth Rate.** Lifetime growth rate has been shown to have no relationship (Patterson et al., 2010) or a negative relationship (Kummer et al., 2005) with age at puberty at

approximately 165 d. Similarly, Amaral Filha et al. (2009) reported that lower growth rates decreased the percentage of gilts showing heat by 10, 20 and 30 d after the start of puberty stimulation at 130 to 149 d of age. Furthermore, when examining the relationship between growth rate until first mating and subsequent performance, Amaral Filha et al. (2010) demonstrated no effect on farrowing rate nor return to estrus rate, and an increase in litter size in females with a growth rate > 700 g/d. However, for those gilts growing faster than 770 g/d, increases in stillborn piglets and in litter variance were detected.

As reported by Patterson et al. (2010), although it appears that neither age nor BW may be reliable indicators of onset of puberty, minimum growth thresholds appear necessary. However, that, at or above commercially acceptable growth rates (> 0.55 kg/d), there is no relationship between growth rate from birth to the commencement of boar contact and recorded age at puberty. Amaral Filha et al. (2010) further refined this recommendation, taking into account the cost of feed, non-productive days, born alive and litter uniformity, starting at breeding, gilts should achieve a growth rate between 600 and 770 g/d for best performance. In a commercial gilt development unit, weights at the onset of puberty were collected (n = 3230) and growth rate estimated. With the growth rates achieved in today's current genotypes, only 8% of all gilts were at risk of slow growth rates (> 0.55 kg/d) and thus, age at puberty will not be limited by slow growth. Conversely, 38% of gilts are achieving growth rates >0.70 kg/d and are at risk of growing too fast. Calderón Díaz et al. (2015) reported that overweight gilts at breeding may be at risk for reduced sow lifetime productivity.

*Recommendation:* Therefore, we would recommend breeding gilts at 2<sup>nd</sup> or 3<sup>rd</sup> estrus, and at the target body weight of 135-150 kg.

## CONCLUSION

Suboptimal gilt management is often overlooked as a contributing factor when trouble shooting reproductive issues. However, the successful introduction and retention of gilts through the early parities drives lifetime performance of the breeding herd and represents an opportunity to improve and enhance overall production. Improved reproductive success depends on the implementation of a good gilt management program and the ability to address the key components to success: 1) Identification of reproductive issues in a timely manner 2) Retention through the selection program (gilt birth weight and birth weight phenotype), 3) Selection of the most fertile gilts 4) Consistent supply of service eligible gilts and 5) Appropriate management for body state at breeding.

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## TROUBLESHOOTING REPRODUCTIVE ISSUES – IDENTIFYING STRATEGIES TO ENHANCE PIGLET BIRTH WEIGHT AND COLOSTRUM INTAKE

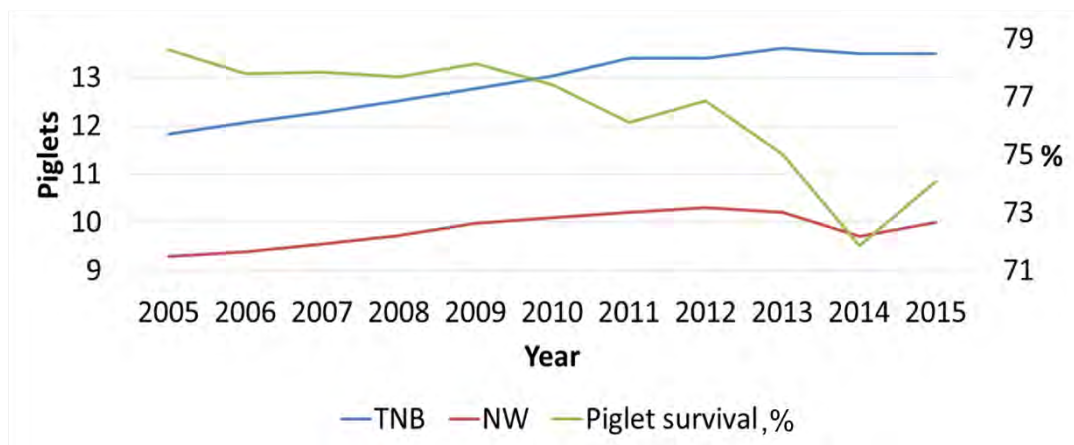
Mark Knauer  
Department of Animal Science  
North Carolina State University  
Campus Box 7621, Raleigh, NC 27695, United States  
mtknauer@gmail.com

### ABSTRACT

As litter size has increased over the past decade the swine industry has observed an erosion in piglet quality. Piglet birth weight and colostrum intake are two major components of piglet quality at weaning. Hence strategies are needed to reduce the percentage of low birth weight piglets and increase piglet colostrum intake. Genetically, differences in piglet quality exist between sire lines. A greater number of functional teats improves piglet colostrum intake and piglet survival. Hence producers should select replacement gilts with the most teats. Nutritionally, increasing the feeding level of gilts in late gestation has consistently been shown to increase piglet birth weight. Increasing feeding level in late gestation, with specific diets, may enhance piglet colostrum intake. Further studies are needed using modern, hyperprolific females to identify technologies that improve piglet birth weight and colostrum intake.

### BACKGROUND

Genetic selection for litter size and improved management practices have resulted in more piglets farrowed per litter in the U.S. (Knauer & Hostetler, 2013). Yet improvements in litter size have compromised piglet survival (Figure 1). Reductions in piglet survival can be explained, in part, by piglet birth weight and piglet colostrum intake. Hence management strategies to enhance these traits are needed to improve piglet survival and reproductive throughput.

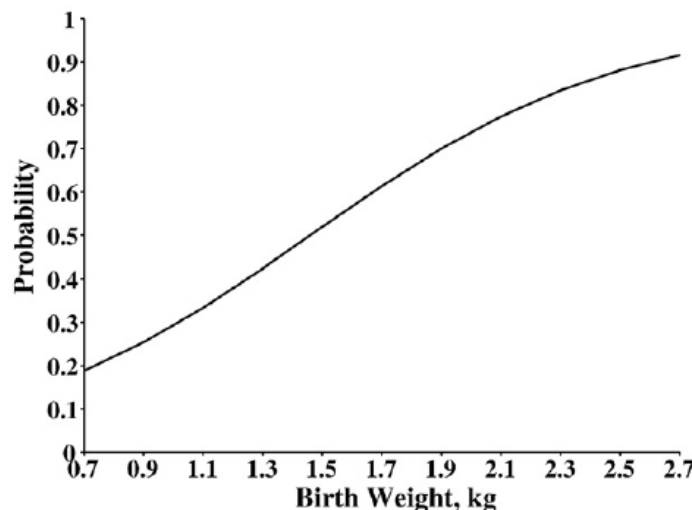


**Figure 1.** U.S. total number born (TNB), number weaned (NW) and piglet survival ( $NW \div TNB$ ) by year (Knauer & Hostetler, 2013; Stalder, 2017).



## Piglet Birth Weight

Piglet birth weight has clear associations with production throughput and efficiency. An increase of one piglet per litter is associated with a 30 to 50 gram reduction in average piglet birth weight (Opschoor et al., 2010). Hence issues with low birth weight piglets have increased over the past decade. Low birthweight piglets have greater preweaning mortality (Fix et al., 2010a), in part due to lower colostrum intake (Devillers et al., 2007) and challenges maintaining body temperature (Alonso-Spilsbury et al., 2007). Chilled piglets seek the sow's udder for warmth making them more likely to be crushed. Fix et al. (2010a) further reported low birth weight piglets had greater mortality in the nursery. In relation to growth rate, low birth weight piglets have poorer average daily gain from birth to weaning, in the nursery and throughout the finishing phase (Fix et al., 2010b). Taken together, these results show low birth weight piglets are less likely to be full value market hogs (Figure 2, Fix et al., 2010a). Besides improvements in throughput, greater piglet birth weight is associated with improved feed efficiency in the finisher at a fixed weight (Volter et al., 2002; Knauer, 2017). Hence improving average piglet birth weight offers opportunities to increase farm income and reduce costs.



**Figure 2.** Association between piglet birth weight and likelihood of a pig being full value at market (Fix et al., 2010a).

## Piglet Colostrum Intake

As litter size increases, colostrum intake per piglet is reduced (Quesnel, 2011; Garrison et al., 2017). Hence issues with piglet colostrum intake have risen over the past decade.

Similar to low birth weight piglets, piglets with low colostrum intake experience reduced survival and growth rate. Declerck et al. (2016) reported piglets with low colostrum intake experienced greater mortality from birth to weaning and during the nursery phase. The same study showed piglets with low colostrum intake were lighter weight at weaning and at market. Similarly, Wiegert et al. (2017) reported low colostrum intake was

associated with increased piglet mortality and reduced average daily gain from birth to weaning. Subsequent data from the same pigs showed piglets with low colostrum intake had decreased finishing average daily gain, yet similar feed efficiency, when compared to piglets with high colostrum intake (Knauer, 2017).

## **STRATEGIES TO ENHANCE PIGLET BIRTH WEIGHT**

### **Genetic**

Genetic selection for litter size in modern maternal lines, without simultaneous improvements in piglet quality, has increased the percentage of low birth weight piglets (Holl and Long, 2006). Yet many genetic suppliers have recently changed their selection practices to put more emphasis on piglet birth weight or other piglet quality measures. Yet genetic change takes time. Hence maternal line improvements in piglet quality made at the nucleus level will take years to filter down to the commercial level of production.

Genetic differences between sire lines for birth weight exist. Parker & Knauer (2017) reported Duroc sired piglets were 110 grams heavier at birth when compared to whiteline sired piglets. Hence identifying terminal sire lines that have greater piglet birth weight is a viable strategy to enhance piglet quality.

### **Management**

Opschoor et al. (2010) reported management practices associated with piglet birth weight across 19 Dutch farms. Farmers were asked a multitude of questions related to their farm. The following given answers are not significantly different ( $P>0.05$ ) but biologically meaningful. Although not significant ( $P=0.30$ ), gilts quarantined before herd entry had a 39 gram higher average piglet birth weight in comparison to gilts directly introduced. Sows group housed had a 61 gram greater ( $P=0.34$ ) average piglet birth weight in comparison to sows housed in gestation stalls. These results are supported by Bates et al. (2003) who reported sows in group housing had higher litter birth weight than sows from individual stalled gestation. The reason sows from group gestation systems tend to have higher piglet birth weights relative to stalls is unclear. Perhaps increased exercise in group gestation, relative to sows in stalls, increases average piglet birth weight. This is supported by Hale et al. (1981) who reported sows that were exercised on a treadmill for 15 minutes per day had numerically higher average piglet birth weights (~70 grams) in comparison to those that were not. Opschoor et al. (2010) further showed the use of prostaglandins numerically lowered ( $P=0.32$ ) average piglet birth weight by 43 grams in comparison to natural farrowing. In agreement, Welp and Holtz (1985) reported piglet birth weight was slightly lower in sows given prostaglandins under field conditions. Since rapid piglet growth occurs during the latter part of gestation, it would be expected that artificially shortening gestation length through prostaglandin use would reduce average piglet birth weight.

The individual collecting data for Opschoor et al. (2010) gave an overall farm hygiene score (very good, good, or average) when visiting each farm. The subjective score was based on availability of protocols and overall impression of hygiene. Average piglet birth

weight tended ( $P=0.10$ ) to be associated with farm hygiene. Average piglet birth weight for farms with very good hygiene weighed 104 grams more than good farms and 224 grams more than average farms. These results support the idea that excellent management will be reflected in a farms production.

## Nutrition

### Increasing feeding level in late gestation

Increasing a sow's feeding level in late gestation is commonly referred to as "bump feeding". Bump feeding has consistently been shown to increase piglet birth weight in gilts (Table 1) but not sows (Table 2). Yet Cromwell et al. (1989) reported average piglet birth weight was increased in sows that were bump fed multiple reproductive cycles. Hence bump feeding modern, hyperprolific sows over multiple cycles warrants further investigation.

**Table 1.** Effect of increasing gilt feeding level in late gestation on average piglet birth weight.

Study	Day of gestation feed	Feeding level, kg	Birth weight, kg	
			Control	Increased feed
Cromwell et al. (1989)	90	1.82 vs. 2.27	1.36	1.40
Shelton et al. (2009)	90	2.09 vs. 2.95	1.41	1.50
Soto et. al (2011)	100	+1.82	1.31	1.44*
Gonçalves et al. (2016)	90	1.89 vs. 2.75	1.28	1.31
Average across studies			1.34	1.41*

\* $P<0.05$

**Table 2.** Effect of increasing sow feeding level in late gestation on average piglet birth weight.

Study	Day of gestation feed	Feeding level, kg	Birth weight, kg	
			Control	Increased feed
Cromwell et al. (1989)	90	1.82 vs. 2.27	1.48	1.46
Miller et al. (2000)	100	2.3 vs. 3.9	1.52	1.53
Shelton et al. (2009)	90	2.59 vs. 3.50	1.54	1.43
Soto et. al (2011)	100	+1.82	NR	NR
Knauer (2016)	100	1.82 vs. 2.73	1.16	1.16
Gonçalves et al. (2016)	90	1.89 vs. 2.75	1.39	1.41
Garrison et al. (2017)	104	1.5 vs. 3.0	1.16	1.16
Average across studies			1.38	1.36

NR = not reported.

### Increasing lysine or soybean meal in gestation

Increasing lysine over nutrient requirements during specific periods of gestation has been shown to enhance piglet birth weight by Yang et al. (2009) and Zhang et al. (2011) (Table 3). While these studies are promising, they need to be replicated using modern, hyperprolific genetics. Attempts to increase lysine and/or other amino acids by increasing soybean meal has been reported to have little impact on average piglet birth weight (Table 4).

**Table 3.** Effect of gestation lysine level on average piglet birth weight.

Study	Day of gestation	Lysine level, %	Birth weight, kg	
			Control	Increased lysine
Yang et al. (2009)	80 to 110	.6 vs. .8	1.29	1.39*
Zhang et al. (2011)	30 to 110	.56 vs. .65	1.35	1.46*
Average across studies			1.32	1.42*

\*P<0.05

**Table 4.** Effect of gestation soybean meal level on average piglet birth weight.

Study	Day of gestation	Soybean meal level,	Birth weight, kg	
			Control	Increased soybean
Mahan (1998)	throughout	12.0 vs. 19.4	1.42	1.36*
Gonçalves et al. (2016)	90 to 111	15.5 vs. 33.6	1.36	1.39
Knauer and van Heugten (2018)	throughout	8.8 vs. 15.0	1.25	1.23
Thomas et al. (2018)	throughout	NR	1.27	1.29
Average across studies			1.33	1.32

\*P<0.05. NR= not reported.

### Carnitine

Feeding L-carnitine in gestation has consistently been reported to increase average piglet birth weight (Table 5). Yet few or no studies have been reported the past decade using modern, hyperprolific genetics.

**Table 5.** Effect of gestation L-carnitine on average piglet birth weight.

Study	Day of gestation	Carnitine level	Birth weight, kg	
			Control	Increased carnitine
Musser et al. (1999)	throughout	100 mg/d	1.48	1.58*
Ramanau et al. (2002)	throughout	125 mg/d	1.38	1.48*
Birkenfeld et al. (2006)	throughout	125 mg/d	1.28	1.40*
Doberenz et al. (2006)	throughout	125 mg/d	1.44	1.56*
Ramanau et al. (2008)	throughout	25 mg/d	1.40	1.48*
Average across studies			1.40	1.50*

\*P&lt;0.05

**β-Hydroxy-β-methylbutyrate**

Feeding β-Hydroxy-β-methylbutyrate (HMB) in gestation has been reported to increase piglet birth weight several times (Table 6). Yet the most recent study, using hyperprolific genetics, reported no differences between the HMB treatment and the control (Parker & Knauer, 2017). Perhaps more studies are needed associating HMB with piglet birth weight using modern, hyperprolific genetics.

**Table 6.** Effect of gestation β-Hydroxy-β-methylbutyrate (HMB) on average piglet birth weight.

Study	Day of gestation	HMB level	Birth weight, kg	
			Control	Increased HMB
Nissen et al. (1994)	112 to 115	2 grams per day	1.44	1.45
Krakowski et al. (2002)	79 to 100	15 mg per kg body wt	1.15	1.24
Tatara et al. (2007)	100 to 115	50 mg per kg body wt	1.31	1.62*
Tatara et al. (2012)	100 to 115	50 mg per kg body wt	1.32	1.62*
Flummer and Theil	108 to 115	2.5 grams per day	1.44	1.54
Parker and Knauer	100 to 115	6 grams per day	1.19	1.20
Average across studies			1.40	1.50*

\*P&lt;0.05

**STRATEGIES TO ENHANCE PIGLET COLOSTRUM INTAKE****Genetics**

Piglet weaning weight is a composite trait of piglet birth weight, piglet colostrum intake and sow milk production. Hence it is assumed that genetic selection for piglet weaning weight would indirectly enhance piglet colostrum intake.

Wiegert et al. (2018) reported colostrum intake from two genetic lines divergently selected for age at puberty. Piglets from the young age at puberty genetic line had

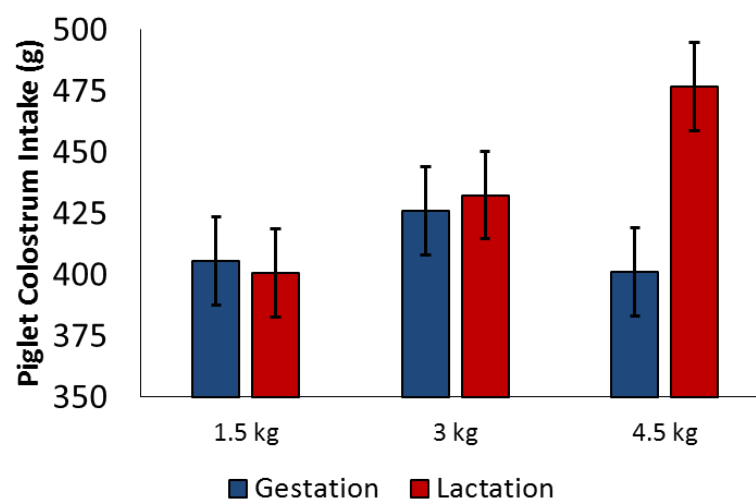
greater colostrum intake when compared to piglets from the old age at puberty genetic line. These results are supported by Vallet et al. (2015) who reported greater piglet immunoglobulin immunocrit levels, a measure of colostrum intake, were associated with a younger age at puberty. Taken together, these results suggest selection for young puberty would indirectly enhance piglet colostrum intake.

## Management

Wiegert and Knauer (2018) reported an increased number of functional teats was associated with increased piglet colostrum intake and piglet survival. These results are supported by Milligan et al. (2001) who reported piglets in large litters had a greater percentage of nursing's missed when compared to piglets in smaller litters. Hence a greater number of functional teats alleviates competition amongst littermates allowing more access to colostrum. Therefore farmers should select gilts with the most teats (assuming structural confirmation is adequate) to enhance piglet colostrum intake and piglet survival.

## Nutrition

Decaluwé et al. (2014) fed sows 1.5 kg or 4.5 kg of a transition diet starting at day 108 of gestation. The authors reported piglets from sows fed the higher feeding level had greater colostrum intake when compared to the lower feeding level. Garrison et al. (2017) fed sows 1.5, 3.0 or 4.5 kg of either a gestation or lactation diet starting at day 104 of gestation. The authors found an interaction between diet and feeding level (Figure 3). Piglets from sows fed 4.5 kg of the lactation diet had greater colostrum intake than piglets from sows fed the other treatments. Collectively, these results suggest feeding levels of more than 3.0 kg in late gestation are needed to enhance piglet colostrum intake and that diet composition is important.



**Figure 3.** Impact of late gestation feeding level and diet on piglet colostrum intake (Garrison et al., 2017).

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## **WORKPLACE REGULATIONS- WHAT WILL IT COST?**

**Katie DeBlock Boersma**  
**Monteith Ritsma Phillips Professional Corporation**  
**56 Albert St., Stratford, Ontario N5A 6W3**  
[deblock@stratfordlawyers.com](mailto:deblock@stratfordlawyers.com)

### **ABSTRACT**

The vast array of legislation impacting Ontario workplaces in agriculture can be nothing short of overwhelming. Navigating through the web of rules and regulations is not only difficult, but often leaves producers feeling like they have fewer answers than they did before.

This paper is designed to provide an overview of some of the main pieces of legislation that every producer should be aware of, as well as some of the real costs and impacts workplace regulation is having on the industry.

While every situation a producer may encounter is different, having a solid knowledge of the legal framework regarding what workplace regulations may apply gives an advance start in dealing with situations appropriately, as well as taking pre-emptive action to ensure legal compliance.

### **LEGISLATIVE FRAMEWORK**

For the purposes of this paper, the following pieces of legislation and a summary of their impact on agricultural workplaces will be outlined:

1. *Employment Standards Act*, 2000, SO 2000 c 41
2. *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1
3. *Workplace Safety and Insurance Act*, 1997, S.O. 1997, c. 16, Sch. A
4. *Human Rights Code*, RSO 1990, c. H.19
5. *Agricultural Employees Protection Act*, 2002, S.O. 2002, c.16
6. *Immigration and Refugee Protection Regulations*, SOR/2002-227
7. *Environmental Protection Act*, RSO 1990, c E.19

### **Employment Standards Act, 2000 (ESA)**

The *ESA* is the primary piece of legislation in Ontario governing the relationship between employees and employers. Among many other employment related rules, it establishes minimum wage, vacation and personal emergency leave entitlement, restrictions on hours of work and overtime and entitlements on termination of employment.

Bill 148, *Fair Workplaces, Better Jobs Act*, which came into effect January 1, 2018, primarily amended the *ESA*. Thus, currently the *ESA* is a hot topic of conversation amongst employers as they try to understand and implement the various new changes to this piece of legislation.

Whenever an employer in agriculture is hiring or firing, the *ESA* is important to keep in mind. Likewise, in dealing with day to day issues that arise with employees (i.e. sick leave, holiday pay, entitlement to breaks) the *ESA* is where most of the answers are.

There are some exceptions to the general provisions of the *ESA* that just apply to agriculture. These exemptions and special rules deal with: minimum wage, hours of work, rest/eating periods, overtime, public holidays and vacation with pay. Whether or not the exceptions apply depends on the type of farming operation.

Violations of the *ESA* can be prosecuted by way of applications to the Ontario Labour Relations Board, or in civil court. Fines range from \$295.00 to \$500,000.00 depending on the offence. Additional damages may be applicable in civil court.

### **Occupational Health and Safety Act, R.S.O. 1990, c. O.1 (OHSA)**

The *OHSA* governs workplace health and safety. It places certain responsibilities on both employers and employees to help create a safe workplace. On a family farm, every location but a residence is considered to be part of the workplace, and subject to the provisions of the *OHSA*.

The *OHSA* includes detailed requirements for certain policies to be in place in the workplace, and practices to be followed if complaints such as harassment or violence are filed by an employee.

It also includes many rules that must be followed in the course of construction projects, right down to the clothing and equipment that must be made available to employees. This can be a tricky area for farmers, because if a construction project is done on farm that paid employees are assisting with, these rules must be complied with.

There is a specific regulation under the *OHSA* for farming operations. It creates an exception for farms operated by a self-employed person(s), and it also creates exceptions for joint health and safety committees on certain types of farms with under twenty (20) employees, as well as exceptions from certain regulations.

Violations of the *OHSA* may be prosecuted in the Ontario Court of Justice, or by way of application to the Ontario Labour Relations Board, or in civil court. Fines under the *OHSA* range as high as \$25,000.00 for an individual and \$500,000.00 for a corporation per charge. Jail sentences of up to twelve (12) months can also be imposed. Non-monetary orders may also be made such as reinstatement of a dismissed employee.

### **Workplace Safety and Insurance Act, 1997 (WSIA)**

The *WSIA* creates a no-fault workplace insurance regime for employers and workers in Ontario. Essentially, if your workplace is covered by the *WSIA*, an employee who is injured on the job is barred from suing the employer. They must seek benefits for their injuries through the Workplace Safety and Insurance Board (WSIB), even if the injury was the fault of the employer.

The *WSIA* regime is not optional. Agricultural employers are required to participate and pay premiums. If an employee is injured while working, the employer is responsible for providing certain information to WSIB. There is also a re-employment obligation if the

employee in question has been with the employer for more than one (1) year, and the employer has twenty (20) or more employees.

Violations of the *WSIA* range as high as \$25,000.00 for an individual and \$500,000.00 for a corporation per charge. Some violations may also be pursued in criminal court if they are fraudulent in nature.

### **Human Rights Code, RSO 1990, c. H.19 (*HRC*)**

The *HRC* protects the rights of employees to be free from discrimination on the basis of prohibited grounds outlined in the *HRC*. This applies to hiring and firing, and treatment within the course of employment.

The most common application of the *HRC* in the agricultural context is in decisions employers make with regard to employees who have a disability, which includes medical illness. Decisions as to whether an employee can be terminated while off on sick leave, or how to deal with an employee who is taking lots of days off due to a medical issue, all must be considered with the *HRC* in mind.

Violations of the *HRC* are heard at the Human Rights Tribunal of Ontario and in civil court. Damages are not capped, and can include lost wages and benefits and general damages. Non-monetary orders may also be made such as reinstatement of a dismissed employee.

### **Agricultural Employees Protection Act, 2002 (*AEPA*)**

The *AEPA* outlines the rights and procedures of employees in agriculture to join an employees' association. In other workplaces, the right to unionize is governed by the *Labour Relations Act*. However, in agriculture the *AEPA* creates a different set of rules which allows workers to form an association and places an obligation on employers to negotiate in good faith with them, but does not allow for traditional unionization and collective bargaining.

Violations of the *AEPA* may be subject to damage awards that are not capped in civil court.

### **Immigration and Refugee Protection Regulations, SOR/2002-227 (*IRPR*)**

Among other things, the *IRPR* regulates the Temporary Foreign Worker Program. The *IRPR* restricts the hiring of temporary foreign workers into roles in what is called "primary agriculture". The *IRPR* regulates the application process, which is broken down into different streams depending on a producer's needs. It also puts rules in place that an employer must follow once accepted into the program.

Violations of the *IRPR* may be subject to administrative monetary penalties (AMPs) which range from \$500 to \$100,000 per violation, up to a maximum of \$1 million over one year. Non-monetary remedies may also be ordered, such as a ban from the program.

## **Environmental Protection Act, RSO 1990, c E.19 (EPA)**

The *EPA* is the principle regulation dealing with pollution and the environment in Ontario. It sets out requirements for dealing with the discharge of contaminants into the natural environment. Contaminants is defined broadly, including everything from waste to noise.

In the agricultural context, the *EPA* and its regulations must be considered in the management of anything that would be considered a contaminant on the farm. This includes manure, noise and dust from equipment or odour from animals.

Violations of the *EPA* are subject to heavy fines and prosecution in provincial court. Under certain provisions, fines in the range of millions of dollars can be imposed, along with jail sentences.

## **CASE STUDIES**

The following case studies will help to demonstrate the cost of violations or non-compliance with some of the workplace regulations summarized above. As the case studies make clear, the costs can be substantial, and include more than just the various fines outlined in the legislation.

### **Violation of the OHSA: *Ontario (Ministry of Labour) v. Cramer Dairy Farms Inc.*, 2009 ONCJ 118**

Facts: Cramer Dairy Farms Ltd. (“Cramer Dairy”) was owned and operated by two brothers. The brothers had employed their nephew Peter to work on the farm. In 2011, Cramer Dairy installed new underground electrical cables and water lines to a milk house and machine shed. The project involved the digging of a trench. During the course of the project, the trench collapsed, and Peter became trapped. Peter died as a result of the accident.

Findings: Because the accident occurred during the course of a construction project, the Construction Regulation of the *OHSA* was found to apply to the case, and Cramer Dairy was found to have been in violation of various aspects of it. The court found that the construction project was “very risky”, due to existing soil conditions including three days of rain prior to the accident, and the inexperience of the person operating a backhoe. The court stated that it was an “unacceptably dangerous situation”. This was an aggravating factor in sentencing.

The court took into account that Cramer Dairy was a small family farm with modest economic activity, and that the family derived its living from the farm when determining the appropriate fine. It also took into account that there were no previous offences, and that since the accident Cramer Dairy had taken steps to produce an employee manual in accordance with the *OHSA*.

Costs: Cramer Dairy was fined \$80,000.00, plus the 25% victim surcharge which amounts to \$20,000.00. Legal fees on an *OHSA* hearing in provincial court would likely range from \$20,000.00-35,000.00.

Total Costs: \$120,000.00-\$135,000.00

**Violation of the ESA: *P&S VanBerlo Limited operating as Berlo's Sweet Potatoes v. Philip J. Banton*, 2016 CanLII 12223 (ON LRB)**

Facts: P&S VanBerlo Ltd. ("VanBerlo Ltd.") was a family run farm growing tobacco, sweet potatoes and ginseng. VanBerlo Ltd. employed as many as 40 labourers at a time. Banton was employed as a seasonal labourer for two years on the farm, before becoming a full time employee for an additional period of six and a half years. He earned \$585.55 per week. In 2013 Banton suffered an injury to his finger resulting in partial amputation while working, and a WSIB claim was filed. The WSIB claim was denied on the basis that WSIB informed VanBerlo Ltd. to offer Banton modified duties. VanBerlo Ltd. made an offer of modified duties to Banton, which Banton refused. Banton then requested that an ROE be issued, so he could go off on sick leave. VanBerlo Ltd. refused to do so, and Banton filed a complaint with the Ontario Labour Relations Board. A few weeks later, VanBerlo Ltd. terminated Banton's employment purportedly on the basis that he had been working for another farmer during harvest season.

Findings: The court found that VanBerlo Ltd.'s decision to terminate Banton was directly related to him having filed a complaint with the Ontario Labour Relations Board. The court found that Banton was owed termination pay. In addition he was owed compensation for loss of expectation of continued employment at a rate of 1 month per year of service, as well as damages for pain and suffering because Banton was injured and unable to work at the time of his dismissal.

Costs: VanBerlo Ltd. had to make payment of \$3,793.00 to Banton for termination pay, \$24,350.99 on account of loss of continued employment and \$5,000.00 for pain and suffering. Legal fees on an Ontario Labour Relations Board hearing would likely range from \$15,000.00-25,000.00.

Total Costs: \$48,000.00-\$58,000.00

**Violation of the ESA: *Juraj Harmaniak v. J.C. Fresh Farms Ltd.*, 2015 CanLII 12241**

Facts: J.C. Fresh Farms Ltd. ("J.C. Fresh") was a 32-acre farm growing tomatoes and peppers. Harmaniak was the assistant grower. His duties including controlling fertilizer and water quality, carrying out irrigation and pest management, and controlling ventilation, light and temperature in the greenhouses. J.C. Fresh was not paying Harmaniak any vacation or holiday pay on the basis of the exemption from holiday and vacation pay in Section 2(2) of Regulation 285/01 to the *ESA* which reads:

(2) Subject to sections 24, 25, 26 and 27 of this Regulation, Parts VII, VIII, IX, X and XI of the Act do not apply to a person employed on a farm whose employment is directly related to the primary production of eggs, milk, grain, seeds, fruit, vegetables, maple products, honey, tobacco, herbs, pigs, cattle, sheep, goats, poultry, deer, elk, ratites, bison, rabbits, game birds, wild boar and cultured fish. O. Reg. 285/01, s. 2 (2).

Findings: The court found that the exemptions in Regulation 285/01 did not apply to Harmaniak's employment because his role did not involve direct "hands on contact" with

the vegetables on the farm. Therefore, his employment was not directly related to the primary production of agricultural products.

Costs: J.C. Fresh was ordered to pay \$2,660.00 in owing holiday and vacation pay. An Ontario Labour Relations Board hearing would likely range from \$15,000.00-25,000.00 for legal costs.

Total Costs: \$17,660.00-27,660.00

### **Violation of the HRTO: *Moore v. Curraghmore Farm Inc.*, 2013 HRTO 1586**

Facts: Curraghmore Farm Inc. (“Curraghmore Farm”) was a horse farm. Moore began working at the farm in May of 2011. In June of 2011 Moore injured his right arm while mowing lawn at the farm. He received a doctor’s note stating that he should be placed on light duties, which he provided to his employer the next day. Moore was told to go home. He returned for his next scheduled shift, and again was told to go home. Moore then received a phone call telling him that he was laid off due to lack of work, and an ROE was issued. After the ROE was issued, Moore was asked to come back to Curraghmore Farm on a few occasions to mow the lawn and complete other work. A WSIB claim was also filed. Moore did not do any other work for the farm after July 1, 2011.

Findings: The court found that Moore had been hired as a permanent employee, not seasonal. Furthermore, there was evidence that there was work available to be done at the farm after Moore was terminated. The court also found that Curraghmore Farm did not accommodate Moore’s injury because he was sent home as opposed to accommodated duties being offered. On a balance of all of the evidence, the court found that Moore was terminated due to his injury, not lack of work.

Costs: Curraghmore Farm was ordered to pay \$13,000.00 as damages for injury to dignity, feelings and self-respect to Moore. It was also ordered to pay a month’s wages for lost wages to Moore, plus interest. The costs of an HRTO hearing would likely range from \$15,000.00-25,000.00 for legal fees. The farm’s WSIB premium may have also increased as a result of the claim, from anywhere in the range of 3-50% depending on total annual premium amount and number of claims filed in a 3 year period.

Total costs: \$30,000.00-\$40,000.00

## **RESOURCES**

Below is a list of resources to provide you with more information about workplace regulation in agriculture, and how it may impact your operation:

Ministry of Labour, Agricultural Workers:

<https://www.labour.gov.on.ca/english/hs/topics/farming.php>

Human Rights Code of Ontario, Guide to Rights and Responsibilities:

<http://www.ohrc.on.ca/en/guide-your-rights-and-responsibilities-under-human-rights-code-0>

Occupational Health and Safety Act, Policy and Programs for Farming Operations:

<https://www.labour.gov.on.ca/english/hs/pubs/farming/policy.php>

Ontario Federation of Agriculture, Regulatory Compliance Checklist:

<https://ofa.on.ca/resources/regulatory-compliance-checklist/>

Workplace Safety and Insurance Board, Custom Farm Work/Independent Contractors/Employee Status:

[http://www.wsib.on.ca/WSIBPortal/faces/WSIBDetailPage?cGUID=WSIB015699&rDef=WSIB\\_RD\\_ARTICLE&afrLoop=505081284184000&afrWindowMode=0&afrWindowId=jbqyed1ik\\_118#%40%3FcGUID%3DWSIB015699%26afrWindowId%3Djbqyed1ik\\_118%26afrLoop%3D505081284184000%26rDef%3DWSIB\\_RD\\_ARTICLE%26afrWindowMode%3D0%26adf.ctrl-state%3Djbqyed1ik\\_138](http://www.wsib.on.ca/WSIBPortal/faces/WSIBDetailPage?cGUID=WSIB015699&rDef=WSIB_RD_ARTICLE&afrLoop=505081284184000&afrWindowMode=0&afrWindowId=jbqyed1ik_118#%40%3FcGUID%3DWSIB015699%26afrWindowId%3Djbqyed1ik_118%26afrLoop%3D505081284184000%26rDef%3DWSIB_RD_ARTICLE%26afrWindowMode%3D0%26adf.ctrl-state%3Djbqyed1ik_138)