



# Results

## PROVIDING SOLUTIONS THROUGH ORIGINAL RESEARCH

### ENGINEERING

- A testing method based on ATP bioluminescence **can be used as a tool for rapid assessment of surface cleanliness** of swine transport trailers, complementing procedures specified in CSHB (2011) guidelines for quality control of wash/disinfect/dry protocols for live-hog transport vehicles. Dirty areas in trailers can be conveniently and rapidly identified using ATP method and corrective actions on current washing/disinfection protocol can be easily made.
- ATP method has moderate correlation with the standard microbiological method using R2A agar plates; no readily apparent relationship was observed between ATP method and MacConkey agar (MCA) plate counts.
- Visual inspection of newly-cleaned transport trailers is **not sufficient in assessing its surface cleanliness**.
- Significant levels of ATP and microbial loads were **detected on trailer surfaces** after cleaning.
- **Trailer floors posed the highest risk** of microbial contamination among all the six critical areas tested.
- Among all design configurations tested, **horizontal flow ventilation system was the most effective in removing heat from the animal occupied zone** (AOZ) in the room during summer and winter seasons. This trend was confirmed in barn trials where the horizontal flow ventilation system design was used in gestation facilities.
- The horizontal flow ventilation system design for group sow housing provides better air quality and cleaner pens than the unmodified conventional ventilation design. It was **more effective in the removal of heat and gaseous contaminants** (CO<sub>2</sub>) from the AOZ compared to the Control room. Animal performance and productivity was not adversely impacted with the installation of a horizontal ventilation system.
- In-barn evaluation of the horizontal flow ventilation system showed about 21% reduction in natural gas consumption during heating season and 14% reduction in electricity consumption. **This translates into, on average, \$1.60/pig savings at current energy prices.**
- Analysis of costs from in-barn trials of the ventilation systems showed energy savings from the horizontally ventilated **would require a 2.2 year payback to accommodate capital and operating costs** for the new system.
- Diagnostic methodology utilizing real time PCR techniques and modified primers was developed for **reliable detection of PED virus**. An infectivity assay using Vero cell cultures was also developed to accurately assess the degree of deactivation of PED virus subjected to the investigated nanoparticle treatments.
- Direct evidence that both Cu nanoparticles and lime treatment **exerted a significant anti-PEDv effect**. Vero culture wells containing PEDv exposed to both Cu-NP and lime for 3 and 6 hours did not show any sign of infection, confirming the PEDv-inactivation effect of Cu-NP and lime treatments.
- From results obtained from Cu-NP and lime treatments, these two agents appear to have potential to be used individually or in combination, as part of existing anti-PEDv strategy. These “bulk agents” can be potentially **applied on large surface areas which may be contaminated with organic material** (e.g., service or assembly yards, loading docks, parking lots) that pose potential risks for PEDv contamination.
- Trials conducted in controlled-environment chambers showed that **sows fed high heat-increment diets tended to maintain relatively lower temperatures** (12.5 °C on average) in the chamber than those fed with standard gestation diet (13.4 °C). There was no adverse effect on performance and physiological response across treatments.
- In-barn trials revealed that sows could tolerate room temperatures as low as 9 °C. Maintaining gestation rooms at lower environmental temperature results in approximately a 78% reduction in energy consumption for heating and ventilation. **This translates into, on average, \$2.80/pig savings during the heating months, at current energy prices.**

In 2016-2017 Prairie Swine Centre will be celebrating its 25<sup>th</sup> Anniversary.

Over this period, Scientists have produced more than 500 research results from projects initiated at the Centre.

# NUTRITION

- Inclusion of 2%, 4% or 8% spray-dried bovine plasma (SDBP) numerically (and linearly) improved growth and feed intake in weanling pigs fed diets contaminated with 5% deoxynivalenol (DON). However, **statistical differences were not achieved** thus we cannot positively conclude that SDBP mitigates the negative effects of DON for nursery pigs.
- Inclusion of spray dried bovine plasma in a stage 1 diet **does not protect against the negative effects of DON** contamination in stage 2 or 3 diets.
- Lecithin (an emulsifier) included in the diet of weanling pigs **mitigated post-weaning weight loss** and improved feed intake.
- An interaction of dietary lecithin and tallow on growth and feed intake of weanling pigs was not observed. This indicates that **improvements associated with lecithin were not due to improved digestibility of tallow**.
- The **performance response of weanling pigs to fermented soybean meals is variable**. Manufacturing parameters require optimization and nutrient composition needs to be accurately characterized.
- Digestibility and fermentability (in vitro incubation with digestive enzymes and fecal inoculum) of oat and wheat straws is **increased by hydrothermal processing methods** (e.g., pressure cooking, steam explosion).
- Fractions of barley and wheat sorted by predicted crude protein, using near infrared seed sorting technology (NIR) content have comparable physical characteristics indicating that **they will respond similarly to processing**.
- Grinding barley costs more per tonne than wheat.
- Grinding using a roller mill costs less than a hammer mill.
- Particle size of grains ground using on-farm mills is frequently larger than expected indicating that **periodic testing and calibration is required**.
- Hydrothermal processing improves phytase enzyme efficacy.

# ETHOLOGY

- Interest in group housing and barn renovations is increasing across the country, with **more producers making the move to renovate barns in Quebec and Ontario** than in the western provinces. The National Sow Housing Conversion Project is actively involved in efforts to assist and educate producers on feeding system options and the management of sows in groups. Project newsletters and the project website ([www.groupshousing.com](http://www.groupshousing.com), launched in January 2016), have proven to be useful tools for sharing information with producers.
- Providing creep feed to piglets in a **tray feeder significantly increases the frequency of visits**, compared to a standard (round, commercial) feeder.
- Providing creep feed to piglets in a tray **increased the number of piglets showing evidence of being an 'eater'** in the pre-weaning period.
- Kinematic studies demonstrated that sows (conducted at AAFC Sherbrooke) **had least change in gait when walking on a 105 mm slat and 19 mm gap width and slats were parallel to sow movement** (compared to solid concrete and slats perpendicular to movement). Slat widths tested were 85, 105 and 125 mm, and gap widths were 19, 22 and 25 mm.
- Initial results indicate housing weaner pigs at different densities showed no effect of space allowance on growth, but **significant effects on behavior**.
- Overall, piglets spent about 70% of their time lying but as the piglets aged they spent less time overlying (lying on top of each other). **At 9 weeks of age, piglets given a lower space allowance continued to spend roughly 60% of their time overlying**, while those given more space spent only 40% of their time overlying.
- Results suggest that **behavioural development may be delayed when less space is provided to growing pigs**, but whether this is of significance to piglet welfare has not been determined.



Saskatchewan  
Ministry of  
Agriculture

For more Information, please contact  
**Prairie Swine Centre**

Box 21057, 2105 8th Street East  
Saskatoon, Saskatchewan CANADA S7H 5N9  
Phone: (306) 373-9922 - Fax: (306) 955-2510  
[www.prairieswine.com](http://www.prairieswine.com)

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