Demonstrating water conservation

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Water is an essential nutrient in pig growth and sometimes can be an easily overlooked part of pig production. Research has found that finisher pigs waste 25% of water from nipple drinkers, even when they are properly adjusted (700 ml/min and positioned 5 cm higher than the shoulder height of the smallest pig)[1]. However, on commercial farms, water wastage from nipple drinkers is reported as high as 40 to 60%. The difference between these results may partly be attributed to the improper drinker height and flow rate on farms. Recent audits of 24 farms across Canada indicate that approximately two-thirds of nipple drinkers (in finishing) provided water volumes that exceeded the pig's requirement. In some cases, measured values were more than double of the required flow rates.

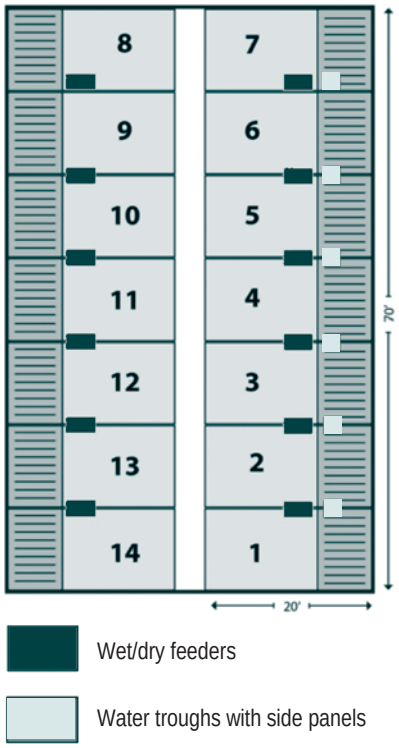

Figure 1. Room layout and setup for demonstration at the commercial farm.

Figure 2. Installation of the water trough with side panels at the commercial farm.

Water Conservation

Barn evaluations of selected water conservation measures indicated that, relative to conventional nipple drinkers, the use of a drinking trough with side panel (and constant water level) saved a significant (60%) amount of water mainly due to reduced water wastage, without adversely affecting pig performance[2]. With the promise associated with this innovation, based on the results of work conducted at Prairie Swine Centre[2], it was decided to implement the trough with the side panel setup on a commercial farm to understand if similar water savings can be achieved.

As seen in Figure 1, a single room was split into two distinct areas with pens 8 to 14 containing a wet/dry feeder and single nipple drinker per pen, which represents a typical room setup. Pens 1 to 7 also contained a wet/dry feeder however the water source was modified to include a trough with side panels integrated with the nipple drinker (Figure 2). In order to measure water disappearance, water meters were installed for each system within the room, and water disappearance rates were measured for two room turns (12 weeks/turn) between May and October 2017.

Economics

The following example provides an overview of potential savings for one specific site in Saskatchewan. Over the 24 weeks that the demonstration project was carried out, water disappearance in pens 1 to 7, where troughs with side panels were installed, was 20% lower when compared to the traditional nipple drinker setup.

Assuming that finishing pigs consume 7 litres of water on a daily basis, the difference in total water disappearance over one year would be 89,250 litres for 170 pigs (Table 1). Also, assuming a manure disposal rate of $0.0175/gal and that the (water disappearance) difference winds up in the manure pits, this would translate into a total additional manure disposal cost of $343 for 170 pigs or $57/pen.

Table 1. Economics of water disappearance

	Water System	
	Troughs with side panels	Nipple drinkers
# of Days	350	350
# of pigs	170	170
L/Pig	7	8.5
Total Water Disappearance (L)	416,500	505,750
Difference (L)		89,250

Table 2: Advantages and disadvantages in implementing troughs with side panels

Advantages	Disadvantages
• Significant water savings • Reduced manure volume • Installed with off-the-shelf components • Improved biosecurity – less traffic to the barn site. – Some sites require manure removal in spring and fall. If water wastage can be reduced farm-wide, manure removal may be reduced to a single application per year.	• One more thing to wash - corners • Higher potential contamination of water in the trough

For this specific site, the producer could expect a 2 to 3.5-year payback on an investment when implementing troughs with side panels in finishing barns.

It must be noted that potential water savings and costs are very farm-specific. For example, some farms may be part of a rural water utility and need to also include the cost of water in their analysis. Every producer should take the opportunity to assess potential savings related to manure disposal, water use, and pumping costs on a regular basis.

Potential Savings

Manure Disposal

- Manure application rate - $0.0175/gallon
- Additional manure volume – 89,250 L or 19,658 gallons
- Additional application cost - $343.57 for 170 pigs over 350 days.

Water Use

- Cost of water - $10.00 per 4,546 litres (1,000 gallons) or $0.0022 /litre
- Additional water cost – 89,250 L @ $0.0022/L = $196.33 for 170 pigs over 350 days.

Installation Costs

- Labour: 2 employees @ $20/hour @ 10 hours = $400 total labour cost to install a trough with side panels integrated with the nipple drinker in 7 pens.

Materials and Supplies

- Trough with side panel (custom fabricated, aluminum) - $100 /pen
- Additional hardware and fittings $10 /pen
- Total installation cost - $1,170 for 7 pens or $167 /pen

Implementation

As with any new technology, proper implementation and training is key to ensuring proper assessment of its use. One of the first questions often asked by staff is: "Will it make my life easier?" After all, this would be the ultimate goal of adopting any new technology. By reviewing the results of the demonstration site, several distinct advantages and disadvantages have become evident.

Conclusion

Based on the results generated from the demonstration project, the producer involved will continue to utilize the trough with the side panel setup within the facility. For this producer, the most interesting advantage was the significant water savings combined with the associated reduction in manure volume produced in the pens where the trough with side panels were installed.

Other Considerations

Research indicates that finishing pigs waste more water when the flow rate is higher[1]. Audit results also show approximately two-thirds of finishing nipple drinkers provide flow rates higher than required by pigs[3]. Producers are well aware of the advantages associated with fine-tuning their water management, however they sometimes lack the resources – time – to ensure it is being carried out on a timely basis. Perhaps incorporating this innovation on the farm can act as an insurance policy when it comes to water management and reducing water wastage.

We would like to acknowledge the support of Fast Genetics (Spiritwood, Saskatchewan) for participating as a demonstration site in the project.

For Further Reading

1 Reducing Water Wastage from Nipple Drinkers by Grower-Finisher Pigs (English) http://www.prairieswine.com/reducing-water-wastage-from-nipple-drinkers-by-grower-finisher-pigs/

2 Developing Strategies for Water Conservation in Swine Production Operations (English) http://www.prairieswine.com/developing-strategies-for-water-conservation-in-swine-production-operations/

3 Managing Water Intake: Auditing Best Management Practices - Part 8 (English)

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efficiency (G:F) in pigs on days 8 to 21 after weaning, regardless of the method of application. This improvement occurred by contrast to the non-acid control and to diets containing phosphoric acid. So feeding acid-preserved wheat using propionic acid (APW-Prop) had comparable performance with pigs fed acidified diets using propionic acid (AD-Prop).

The addition of phosphoric acid to wheat did not significantly affect piglet performance, and its potential as a grain preservative requires further investigation.

Regardless of which acid is used, producers will find it useful to know that galvanized steel is more prone to corrosion than carbon steel. Furthermore, propionic acid is more corrosive than phosphoric acid in carbon steel (but not in galvanized steel). Overall, organic acids such as propionic acid are typically more expensive, and, as we found out in this study, are also more corrosive to farm equipment than the inorganic phosphoric acid.

A second objective of this trial has been met—that through acid preservation producers will have an alternative tool of using low quality, high moisture wheat as feed, with a potential to reduce cost by eliminating the need to dry the grain artificially.

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Danilo Sotto, Jr also gratefully acknowledges the Gowans Feed Consulting Graduate Student Award Program that has provided him with an industry funded position to undertake graduate research and experimentation at the Prairie Swine Centre.

Editor's Note:

Danilo Sotto, Jr was recently awarded the R.O. Ball "Young Scientist Award" at the Banff Pork Symposium (January 9 to 11, 2018) for his research on weanling diets. From a pool of some 20 students, Danilo was named one of only four finalists, and then won the competition. Judging was based on the quality of applicants' research abstracts and on the degree of relevance of their research to agricultural use.