Developing Strategies for Water Conservation for Producers

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Summary

Animal drinking and cleaning are the top uses of water in swine barns. Using water conservation strategies to reduce water use will ultimately lower cost of production and contribute towards a more sustainable environment as less manure slurry is created. In order to find out which water conservation strategy is most effective, experiments were performed using different animal drinkers and cleaning strategies. It was found that about 60% less water wastage was achieved when a trough with side panel and constant water level was used compared to the nipple drinkers. Also, at barn clean up, the use of a conventional nozzle led to lesser time and water consumption during high pressure washing.

Introduction

In swine operations, water is mainly used for animal drinking and cleaning. The rate of water use has an impact on the overall production cost and on the environment. Indiscriminate use of water can increase the volume of waste water and manure slurry generated from the operation leading to added manure handling costs, and improper manure management particularly during land application can potentially lead to degradation of water bodies. Therefore more efficient use of water is essential not only for economic reasons but also for environmental sustainability considerations. This report describes different water conservation practices pertaining to animal drinking and cleaning in an actual barn facility and assesses their effectiveness in reducing overall water use.

Experimental Procedures

Two different experiments were performed. The first experiment involved installing three different drinkers in a grow-finish room to evaluate the overall water use (disappearance), water wastage, and water contamination level, as well as average daily gain and average daily feed intake of the grow-finish pigs. The animal drinkers used included a nipple drinker, a nipple with side panel, and a trough with side panel and constant water level (Figure 1).

The second experiment involved performing two different cleaning strategies in a grow-finish room with partially and fully slatted concrete flooring. The cleaning strategies included 1) water sprinkling (soaking) prior to high pressure washing and 2) use of different high pressure washing nozzles: conventional nozzle, Y-nozzle, water broom, and 4-in-1 nozzle (Figure 2). The water consumed, the time spent during subsequent pressure washing as well as the surface cleanliness were then evaluated.

> A modified water trough reduced water wastage by 60% compared to a standard water nipple.

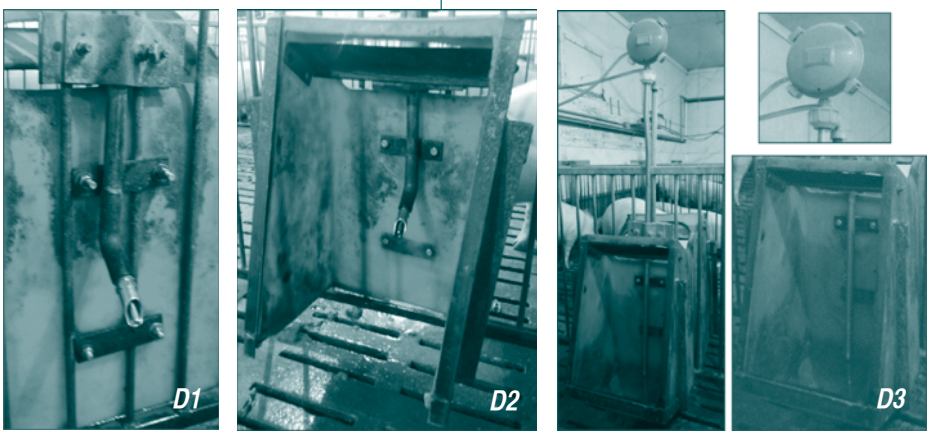

Figure 1. Three types of animal drinkers used: nipple (D1), nipple with side panel (D2) and a trough with side panel and constant water level (D3).

Results

For animal drinking, it was found that about 60% reduction in water wastage was achieved when a trough with side panel and constant water level was used compared to the nipple drinkers (Figure 3). The water intake from all drinkers were within the water intake requirements for grower-finisher pigs. In addition, the use of the trough with side panel and constant water level had no significant effect on average daily gain and average daily feed intake of pigs although the water in the trough had significantly higher microbial ATP (adenosine triphosphate) levels than in nipple drinkers.

Examining the cleaning strategies, it was found that water sprinkling (soaking) in fully and partially slatted concrete flooring resulted in significantly higher water consumption than without sprinkling. However, sprinkling partially offset the washing time. Comparing the different nozzles, the use of the conventional nozzle led to the lowest time spent cleaning and water consumed among all test nozzles (Figure 4). Also, the use of the Y-nozzle or the conventional nozzle achieved the highest significant reduction in microbial ATPs on plastic and concrete surfaces, respectively.

The Bottom Line

The use of the trough with the side panel and constant water level for drinking has the greatest potential for water savings without affecting pig performance. High pressure washing using the rotating turbo nozzle led to lesser time and water consumption during the cleaning process. Also, high pressure washing in fully slatted concrete flooring can be done without prior water sprinkling (soaking).

Acknowledgement

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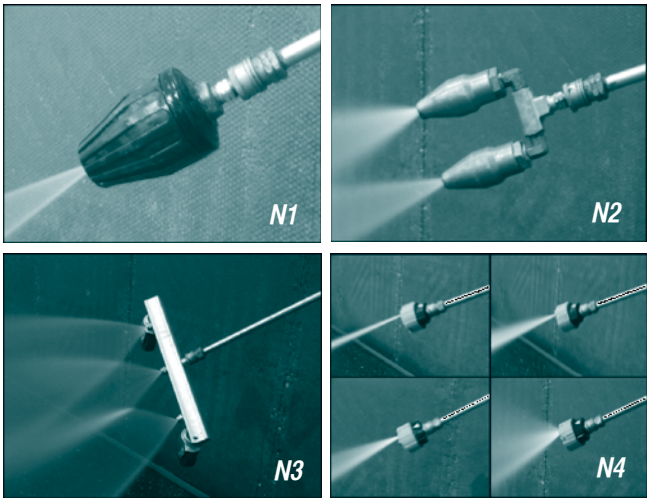

Figure 2. Four different type of power washing nozzles used: conventional nozzle (N1), Y-nozzle (N2), water broom (N3), and 4-in-1 nozzle (N4).

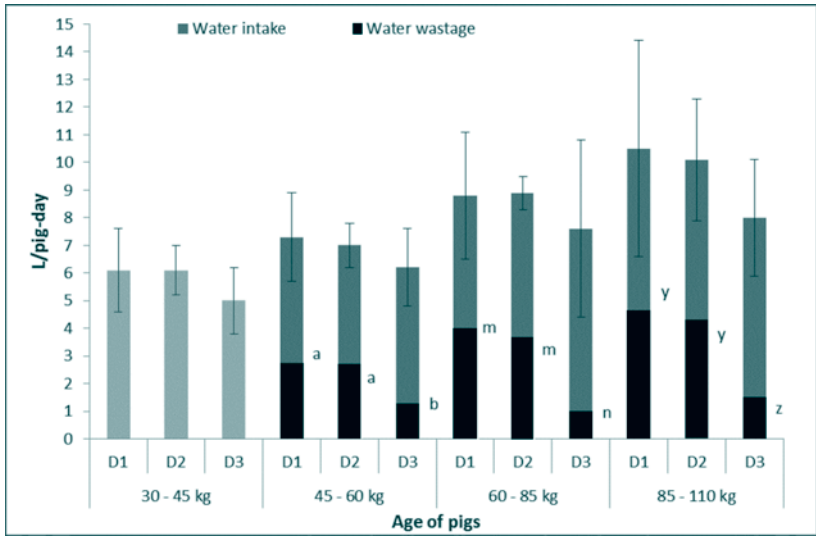

Figure 3. Effect of different types of drinkers on water disappearance, intake and wastage, n=4. Means (water wastage) with the same letters are not significantly different (p>0.05) from each other. D1 – Nipple; D2 – Nipple with side panel; D3 – Trough with side panel and constant water level.

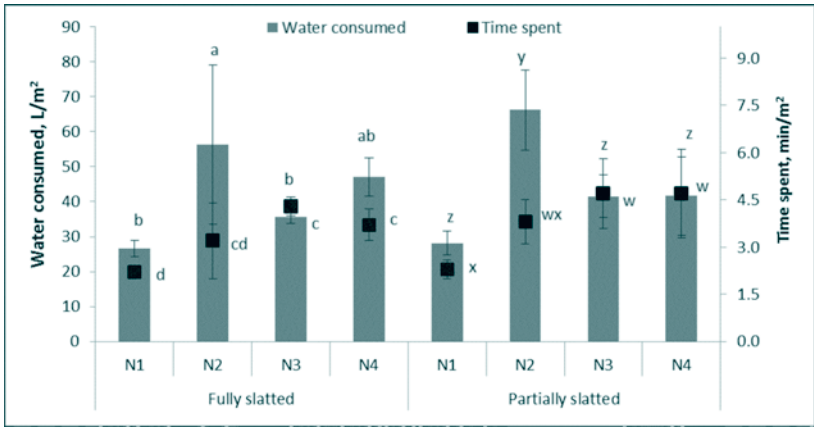

Figure 4. Effect of different types of nozzles on time and water consumption, n=5. Means with the same letters within the same type of flooring are not significantly different (p>0.05) from each other. N1 – Conventional nozzle; N2 – Y-nozzle; N3 – Water broom; N4 – 4-in-1 nozzle.