

## Effect of different cleaning protocols on freshwater use in the pork production chain

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### Abstract

Water plays a crucial role in the pork production chain. Fresh water is used for feed production, and for drinking and cleaning purposes. Increasing emphasis on sustainable use of water resources highlights the need to quantify and characterize fresh water use along the pork production chain. To properly address water use, a distinction should be made between green and blue water, with the first referring to soil moisture available for plant growth, and the second to liquid water stored in water bodies. To quantify and reduce the blue water footprint of pork, detailed information about water used for drinking and cleaning purposes on pig farms is required.

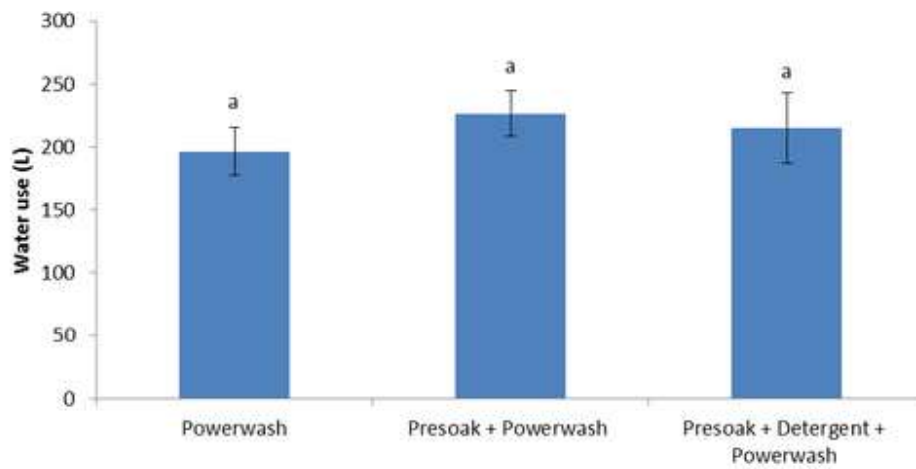
Washing of pens between batches of pigs is a routine activity on pig farms as it helps to remove pathogens from the previous batch. This is particularly important for newly weaned pigs, which are extremely vulnerable to infectious diseases. The method of washing, however, varies between farms. The aim of this study was to quantify fresh water used during washing of weaner pens using different combinations of cleaning protocols to determine which procedure cleans most effectively with the least amount of water.

The cleaning protocols evaluated in this study were: P1: power washing only; P2: presoaking with water followed by power washing and disinfection; and P3: presoaking with water followed by detergent, power washing and disinfection. Detergent used was Kenosan, (0.5% dilution rate) and disinfectant was Hyperox (1% dilution rate).

We used three weaning rooms in this experiment. Each room had 10 pens (2.4 m × 2.6 m) with a capacity to hold up to 14 pigs each. Pigs remained in the weaner stage for seven weeks, weaned, and then pens were cleaned before the next batch of pigs moved in. Over three replicates, one of the three cleaning protocols was applied to each room between batches. To compare the efficacy of the protocols, swab samples were collected from the floor (n=2), wall (n=1) and feeder (n=1) from 3 randomly selected pens in each room, before and after cleaning. Each swab was tested for the presence of *Enterobacteriaceae*, *Staphylococcus* and total bacterial count (TBC). The volume of blue water used for power washing and presoaking was also measured, and the time it took to clean each pen.

Data were analyzed using the mixed models procedure in SAS v9.4. There was an effect of cleaning protocols on the time taken to clean a pen (P1 = 15.69 ± 0.49, P2 = 13.36 ± 0.47, P3 = 11.52 ± 0.53) minutes. However, there was no difference in total water used for the cleaning protocol, (P1 = 196.4 ± 18.76, P2 = 226.6 ± 18.16 and P3 = 215.4 ± 27.85 liters) (Figure 1). Neither was there an effect on water used per pig or water use per pigspace.

There was no effect of cleaning protocols, or interaction between protocols and sampling time on the bacterial counts. The *Staphylococcus* and TBC counts were lower after washing than before (P < 0.001), but there was no effect of washing on *Enterobacteriaceae* counts. The location of sampling (floor, feeder or wall) had an effect on bacterial counts (P < 0.001).



**Figure 1.** The effect of the different treatments on total water used to wash weaner pens. Similar letter on the bar indicates no significant difference between cleaning protocols.

In summary, different cleaning and disinfection protocols did not affect the water used, but there was a reduction in the time taken to do the power washing if presoaking was done and detergent was used. For the bacterial counts, no difference was found between the three protocols used but *Staphylococcus* counts and TBC reduced from prewash to post wash. Thus, the cleaning protocols used in this study had no effect on the blue water use of the pork production chain. Since there was no difference in both water use and bacterial load, power washing without presoaking detergent or seem to be the preferred option.