The positive effects of acidifying the water with organic acids

Do you know that water is often a forgotten ingredient on a swine farm and is checked only when production problems arise? Should a producer ignore water quality? The answer is an unequivocal no!

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This article will explain why water is so important and examine the role organic acid blends applied via water can play in supporting pigs' health and performance. Insights look at data from 25 trials conducted in production regions around the globe.

WATER IS KEY TO QUALITY PRODUCTION

As an essential nutrient required for physiological functions, water makes up approximately 70–80% of a piglet's body. Swine consume a lot of water. As a rule of thumb, pigs drink 2–3L of water per 1kg of feed intake. Reduced water intake should be taken seriously.

Clean, fresh, and safe water must be continually available. The water source, storage tank and pipes can influence the quality of the water. Controlling biofilm in pipes and storage tanks is an important step in protecting water quality. Flushing water through pipes can be effective in removing biofilm. When was the last time you flushed the water on your farm?

Considering that water is consumed in large quantities, compromised water quality can lead to an increased risk of contaminants reaching harmful levels that could negatively impact pigs' performance, health, and welfare.

This is a special concern for weaning piglets, as water intake at weaning is low, limiting water movement and increasing contamination risk. At the same time, environmental temperatures



are often high to prevent piglets from being chilled. Such conditions are ideal for harmful microorganisms to multiply in slow-moving, warm water, lowering animals' growth rates, decreasing intake and potentially resulting in scour.

If there is any doubt concerning water conditions and contamination, samples should be sent to a laboratory for analysis. Depending on the findings, management strategies including filtration, chlorination, and acidification, among others, should be applied.

Chlorination and acidification are the most common strategies. Adding 3–5ppm free chlorine (or 650–700 mV ORP) provides adequate microbial control in a short contact time (i.e., E. coli or Salmonella are killed within 30 seconds). Lowering water pH can be an effective way to prevent the growth of microorganisms (i.e., E. coli and Salmonella, pH <4.0).

ORGANIC ACIDS IN WATER SUPPORT SWINE PERFORMANCE AND HEALTH

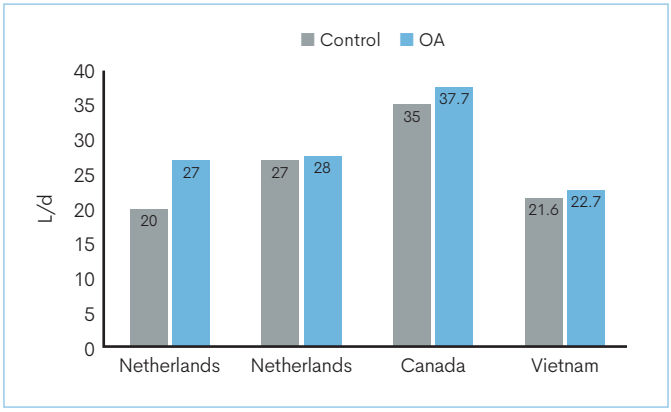
Water acidification has a two-part effect, acting in water, and the animal's stomach. Organic acids (OA) can reduce the pH level of water. If the blend of OA is buffered, the water pH decrease is not sharp and can remain at a level around 3.8–4.0.

Furthermore, the blend can be dosed at a higher dosage, providing more OA molecules for better animal performance support. A combination of water chlorination and acidification is a good strategy for supporting a better-balanced microbiota entering the swine digestive system through water.

Chlorine works as a biocide and OA helps support animal health and performance.

Water acidification is especially interesting for weaned piglets, as these young animals lack sufficient capacity to acidify their stomach content with hydrochloric acid (HCl). This can lead to suboptimal protein digestion and a pH that stays between 4–5. Adding OA to water increases the speed at which the stomach contents reach the optimal pH value, where the proteolytic enzyme pepsin has its optimum efficacy.

Fig. 1. Supplementation of organic acids (OA – SWA) via water increases lactating sows' water intake.



THE EFFECT OF AN ORGANIC ACIDS BLEND ON ALL STAGES OF SWINE PRODUCTION

Trouw Nutrition developed Selko AlpHa, a water acidifier composed of a blend of free and buffered OA that reduces and stabilises the pH of water. Selko water acidifier (SWA) also improves feed digestion by reducing stomach pH. Buffered OA contribute to a healthy microbial balance in the proximal small intestine, resulting in optimal feed utilisation and animal performance.

The data below comes from more than 25 trials that Trouw Nutrition conducted in seven countries on five continents. All studies showed that adding SWA delivered a positive effect on performance in sows, weaned piglets, and fatteners.

1. Sows: improved water and feed intake, weaning heavier piglets

Lactating sows have a high water requirement (20–35 L/d), to help them recover the large amount of fluid lost at farrowing, reduce

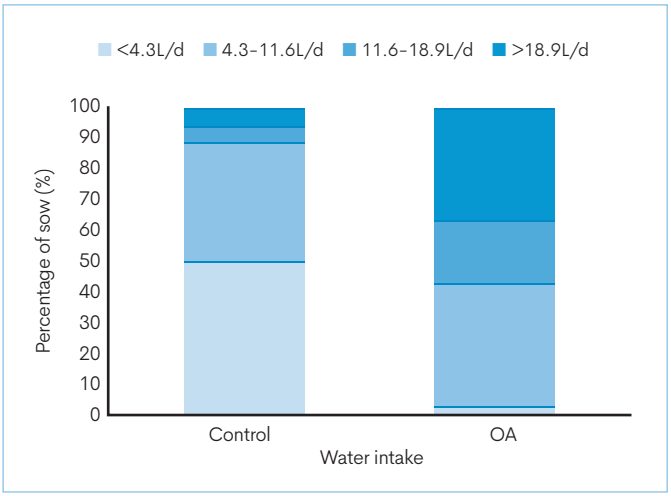


Fig. 2. Effect of adding organic acids (OA – SWA) on water intake during gestation.

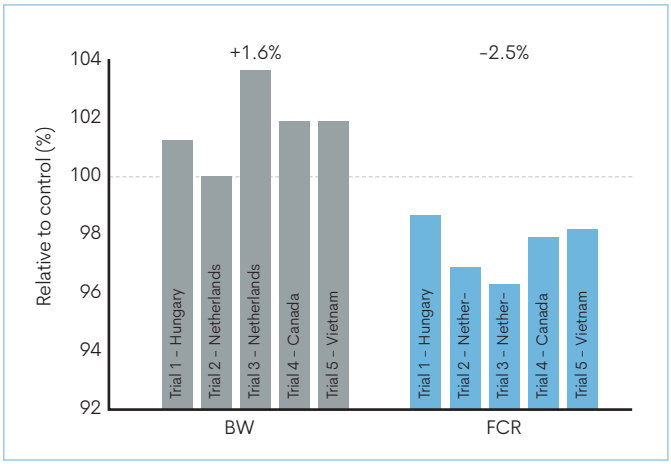


Fig. 4. Effects of Selko water acidifier on final body weight (BW) and feed conversion ratio (FCR) of growing-finishing pigs relative to a control.

constipation issues, lower the risk of urinary tract infections, and support optimal milk production.

During lactation, and especially during warmer months, it is challenging for sows to keep an adequate water and feed intake.

A reduction in feed intake can lead to body weight loss and reduced milk production, which will directly affect piglet weaning weight.

As feed intake and water intake are correlated, stimulating water intake, will help sows to eat more.

Researchers conducted four studies involving 1466 lactating sows. Occurring in different countries, trials showed that applying SWA increased sow water intake by 12.6% (Fig. 1) and feed intake by 1.5%, resulting in less body weight loss (-6.6%) and heavier piglets at weaning (+3.9%).

What about gestating sows? Can applying OA to water impact gestating sows that also have a high water intake requirement (7-12L/d)? Study findings showed a large variation in individual water intake in gestating sows (2.3 to 22 L/d; 7.8L/d average, – data of Trouw Nutrition Swine Research Centre, Netherlands).

Interestingly, sows with low water intake (< 4L/d) had lower piglet birth weight (1.30 vs 1.36kg), lower colostrum intake (452 vs 495g/piglet) and lower piglet weight on day 1 (1.39 vs 1.47kg), compared to sows with high (> 10.5L/d) water intake.

When gestating sows were supplemented with SWA, they drank significantly more than the control sows, with an average above requirement (17.6L/d, Fig. 2).

2. Weaned piglets: improved performance

The stress of weaning can negatively affect feed intake, resulting in a decrease in growth performance. This is usually compensated by drinking more water.

Eating and drinking are positively associated. A compilation of 16 studies involving more than 9000 piglets shows an average increase in daily water (+400mL, +21.8%) and feed intake (+18g, +3.1%). This increased intake contributed to higher body weight (+800g, +4.0%) and lower FCR (-5.5 points, -3.3%) at the end of the nursery phase (Fig. 3).

An important effect of OA in weaned piglets is the support of stomach acidification.

At weaning (3-4 weeks), the still immature gastrointestinal tract faces big challenges including changes in the physicochemical properties of the feed and the pattern of feed intake (consumption of large meals at infrequent intervals).

To complicate matters, in the first 3-4 weeks post-weaning, HCl production is not yet sufficient, resulting in a stomach pH of around 5.0, and pepsin activity is low[1,2].

This situation reduces the digestion of feed, which then ferments in the hindgut and may result in diarrhoea. Pepsin works best in acidic conditions (pH 2.0-3.5) and activity declines rapidly above this range[3].

To better digest protein, a low stomach pH is needed and can be supported by OA. In a study with SWA, supplemented piglets' stomach pH was lower compared to the control piglets at 66 days of age (3.1 vs 3.6 pH, P=0.07. Study with 332 piglets).

3. Grower-finisher pigs: lower FCR

Most producers do not invest in feed additives for grower-finisher pigs.

However, it is important to consider that feed price is a significant production expense – representing about 70% of production costs.

In addition, 2-3kg of feed will result in 1kg of body weight gain on average, for fatteners. Therefore, improving feed efficiency may present a great opportunity for producers to achieve better economic results.

Nutritional interventions including blends of OA can help manage pigs' health and performance while delivering a positive return on investment. An average of five studies, using slightly more than 3700 fatteners, shows an average increase in final body weight (+1.4kg, +1.6%) and lower FCR (-5.6 points, -2.5%) (Fig. 4).

What is the value of a 1 point improvement in FCR for your farm? A blend of OA can help support producers' businesses, especially during times when raw material prices are high.

Organic acids have been demonstrated to support swine performance and farm economics, across all phases of swine production. ■

References are available from the author on request

Fig. 3. Effects of Selko water acidifier on final body weight (BW) and feed conversion ratio (FCR) of weaned piglets relative to a control.

