Water-Based Growth Promotion

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The use of in-feed antimicrobials in nursery pig diets has long been recognized as a method to improve growth performance and health. But the use of these feed additives poses several challenges to swine production systems. First, changing the type of antimicrobial can be difficult due to feed-processing limitations. Second, handling multiple antibiotics in the mill leads to multiple runs of feed and concerns with cross-contamination with non-medicated feed. Third, pulsing antibiotics can be very difficult with feed application due to the difficulty of timing the delivery of the feed. Replacing in-feed with water-based antimicrobials would simplify feed processing and reduce the risk of feed being contaminated with an inappropriate antimicrobial or antimicrobial residue. Therefore, we conducted a series of experiments to evaluate the effectiveness of water-based antimicrobials as a potential replacement for typical feed delivery of antimicrobials for improving nursery growth performance.

In Exp. 1, 350 pigs (initially 5.9 kg) were allotted to one of five treatments 3 d after weaning: 1) negative control (no antimicrobial in the feed or water); 2) positive control diet containing neomycin sulfate and oxytetracycline (154 ppm neomycin sulfate, 154 ppm oxytetracycline HCl; NEO/OXY); 3) neomycin sulfate in the water (25 mg neomycin sulfate per L); 4) oxytetracycline in the water (25 mg oxytetracycline HCl per L); and 5) combination of treatments 3 and 4. Overall (d 0 to 28), pigs provided water medication had greater ($P<0.02$) ADG and ADFI compared to negative control pigs. Pigs fed diets containing NEO/OXY had greater ($P<0.01$) ADG and ADFI than pigs provided water medication. There were no differences in performance among water medication treatments. We believed the lower ADG for pigs provided with medication via the water may have been due to lower medication intake. Thus, the second experiment was conducted with multiple medication levels.

In Exp. 2, 360 pigs (initially 6.4 kg) were allotted to one of eight treatments 3 d after weaning: 1) negative control (no antibiotic in the feed or water); 2) positive control with NEO/OXY in the feed; 3, 4, and 5) neomycin sulfate in the water (38.0, 75.5, and 113.5 mg neomycin sulfate per L, respectively); 6 and 7) neomycin sulfate in the feed (157 and 314 ppm, respectively); and 8) combination of treatments 2 and 4. Overall (d 0 to 24), pigs fed the positive control diet and pigs provided neomycin sulfate in the water or feed had greater ($P<0.05$) ADG and ADFI compared to negative control pigs. Pigs provided the combination of the positive control diet and medicated water (Treatment 8) had greater ADFI ($P<0.04$) than pigs provided treatment 2 or 4. Increasing neomycin sulfate in the water or feed linearly increased ($P<0.04$) ADG and ADFI. There were no differences in growth performance among pigs provided neomycin sulfate in the water or feed. Growth performance was similarly improved by adding neomycin sulfate to either the feed or water. This experiment proved that growth promotion is similar when similar levels of the medication were consumed via the feed or water.

In Exp 3, 360 weanling pigs (initially 5.2 kg and 18 ± 3 d of age) were used to determine the effects of intermittent use of water-based medication on nursery pig growth

performance. Pigs were blocked by initial weight and randomly allotted 3 d after weaning to one of eight treatments: 1) negative control (no antibiotics in the feed or water); 2) positive control diet containing 154 ppm neomycin sulfate and 154 ppm oxytetracycline HCl; 3) and 4) continuous use of 38.0 and 75.5 mg neomycin sulfate per L of water, respectively; 5) and 6) use of 38.0 and 75.5 mg neomycin sulfate per L of water, respectively, during wk 1 and 3 after placement; and 7) and 8) use of 38.0 and 75.5 mg neomycin sulfate per L of water, respectively, during wk 2 and 4 after placement. Overall (d 0 to 28), pigs provided neomycin sulfate in the water continuously (Treatments 3 and 4), and pigs fed the positive control diet had greater ($P<0.05$) ADG and ADFI compared to pigs provided non-medicated water and feed. There was no difference however, in growth performance and G;F between pigs fed the positive control diet and those provided continuous water-based neomycin sulfate. Numerical increases in ADG and ADFI were observed when pigs were provided water-based neomycin sulfate after drinking non-medicated water as a part of weekly intermittent dosage. However, growth performance returned to the control level immediately after the supply of neomycin sulfate was removed. Pigs provided continuous water medication had greater ADG ($P<0.02$) and ADFI ($P<0.04$) than pigs provided an intermittent supply of water-based neomycin sulfate. These data demonstrate that providing neomycin sulfate in the feed or water results in a growth response; however, there is no carryover effect to support intermittent usage of this type of antimicrobial.

These experiments demonstrate that providing Neomycin sulfate in the water or feed resulted in improved growth performance, compared with that of pigs fed non-medicated feed and water. Similar performance was obtained whether the medication was provided via the feed or the water. This indicates that water-based medication can be used in place of medication in the feed to yield similar growth performance. Providing Neomycin in pulses improved performance when it was in the water; however, there were no carryover effects with performance returning to control levels immediately after the antibiotic was removed from the water. Thus, although medication cost is reduced, ADG and net profit was also reduced by pulsing the medication. At the present time, water based medication is usually still more expensive than providing the medication in the feed for growth promotion; however, using the medication in the water increases flexibility in the feed mill and provides another mode of delivery for growth promotion levels of medication.