

Comparing the effects of *Bacillus* Direct Fed Microbial combination strain on nursery pig growth with and without medication fed a reduced zinc and copper diet

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Background and objectives: The agriculture industry is being challenged to produce more animal protein while reducing or removing zinc, copper and antibiotics from production methods. High levels of copper and zinc oxide are currently added to feed for growth promotion in the swine industry¹. *Bacillus licheniformis* and *Bacillus subtilis* are thought to enhance GIT microflora and composition and may provide a benefit to producers looking to reduce the prophylactic use of antibiotics and the levels of zinc and copper added to diets.

Material and methods: (360) pigs were assigned to pens based on weight on the day of weaning (~16-21 days of age). 36 pens per room with 10 pigs per pen randomized complete block design. 4 treatments and 9 reps were raised in a 4X dirty room. All diets included reduced levels of zinc and copper compared to standard industry diets at time of research.

Treatment Descriptions:

A Control diet (no medication or direct fed microbial)
B Control diet + <i>Bacillus licheniformis</i> / <i>Bacillus subtilis</i> DFM (113g added to US ton of finished feed)*
C Control diet + medication schedule**
D Control diet + medication schedule** + <i>Bacillus licheniformis</i> / <i>Bacillus subtilis</i> DFM (113g added to US ton of finished feed)*

Direct Fed Microbial Schedule:* *Bacillus licheniformis*/*Bacillus subtilis* DFM fed continuously for assigned treatments at the 3 x 10⁵ cfu/g to a finished ton of feed.

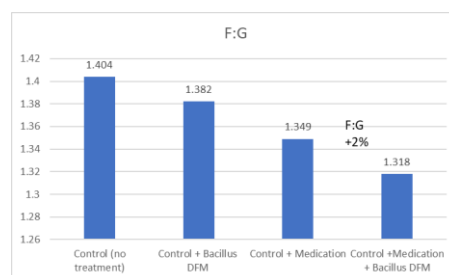
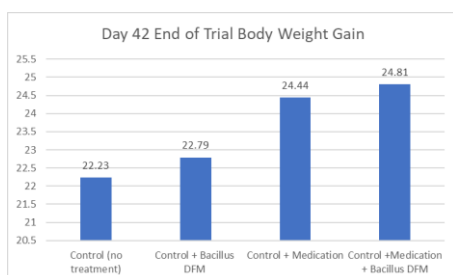
Medication Schedule:** Phase 1 (0-7 days), Neo/Terr 50-50
Phase 2 (7-21 days), Chlortetracycline 50G/Denagard 10
Phase 3 (21-42 days), BMD 60 (Bacitracin Methylene Disalicylate)

Zinc and copper dosing schedule compared to standard:

	<u>All Research Diets - Zinc</u>	<u>All Research Diets - Copper</u>
•Phase 1 (0-7 days)	1000 PPM (2000 standard)	250 PPM (250 standard)
•Phase 2 (7-21 days)	1000 PPM (2000 standard)	14 PPM (250 standard)
•Phase 3 (21-42 days)	1000 PPM (2000 standard)	14 PPM (250 standard)

Results: Overall (D0 to 42) pigs fed medicated diets had statistically (P<0.05) improved performance compared to those pigs fed diets without medication. Pigs fed *Bacillus* DFM had numerically improved gain, feed conversion, and final body weight when compared to their respective diet without the *Bacillus* DFM, with and without medication. *Bacillus* DFM + medication improved F:G 2%.

Conclusion & Discussion: Significant reductions in zinc and copper in the research diets may have been offset by the addition of the *Bacillus* DFM with and without medication based on research outcomes in both weight and feed to gain. Further investigation may include pathogenic challenge to the nursery pigs fed reduced mineral diets to see how supportive the *Bacillus* DFM would be in a challenge setting. An additional treatment might be added to include standard mineral levels to compare to reduced levels.



1. Hill GM, Spears JW. Trace and ultratrace elements in swine nutrition. In: Lewis AJ, Southern LL, eds. *Swine Nutrition*. 2nd ed. Boca Raton, Florida: CRC Press; 2001:229–261.