



An interview with  
Daniel Nelson, PhD, PAS  
Senior Nutritionist  
Zoetis Technical Services

“...pigs fed the antimicrobial BMD® (bacitracin methylene disalicylate) had better growth and feed conversion despite heat-stress exposure compared to controls.”

## Maintaining performance in growing pigs despite production stress

**Q: What are the primary causes of stress in growing pigs?**

**DN:** It doesn't take much to stress a pig. Weaning, commingling, crowding, moving, abrupt temperature changes, disease — and the list goes on. Unfortunately, much of the stress pigs encounter is inevitable and sometimes leads to reductions in growth and poor feed efficiency. It also makes pigs more susceptible to disease.<sup>1</sup>

**Q: How does stress lead to poor pig performance?**

**DN:** Stress has been shown to activate stress hormones. They're part of the animal's flight-or-fight response, but in excess, they can cause tissue damage to the gut barrier.<sup>2</sup>

That barrier protects pigs from noxious compounds within the gut. To do its job, the intestine needs tightly joined cells — tight junctions — to keep out toxins and microorganisms. If the barrier gets damaged, protection is impaired. The gut isn't just responsible for nutrient absorption, it also plays a major role in immunity.

**Q: Can't pigs recover from stress?**

**DN:** They can but it depends on when stress occurs. If it's at the same time young pigs are rapidly developing their gastrointestinal system — the first several weeks of life — there may be improper gut-barrier development. The damage may cause performance problems throughout the pig's life.<sup>3</sup>

**Q: Could antimicrobials help manage stress in pigs?**

**DN:** In studies conducted at North Carolina State University, pigs fed the antimicrobial BMD® (bacitracin methylene disalicylate) had better growth and feed conversion despite heat-stress exposure compared to controls.<sup>4</sup>

*continued*

“ In both studies, gut integrity was significantly better ( $p < 0.05$ ) in the medicated versus unmedicated pigs. ”

Another study subjected pigs to both mixing and crowding. Once again, pigs fed BMD had better growth and feed conversion.<sup>5</sup>

**Q: Were there any other important findings?**

**DN:** In the heat-stress study, endotoxin levels were significantly lower ( $p < 0.05$ ) in pigs fed BMD compared to unmedicated pigs.<sup>6</sup> And in pigs subjected to mixing and crowding, a type of cytokine — a protein that causes inflammation — was significantly lower ( $p < 0.05$ ) in pigs fed BMD compared to the unmedicated controls.<sup>7</sup>

In both studies, gut integrity was significantly better ( $p < 0.05$ ) in the medicated versus unmedicated pigs.

**Q: How was gut-barrier integrity evaluated?**

**DN:** The researchers used two tests. One was transepithelial electrical resistance. Lower electrical resistance reflects more gut permeability, indicating gut-barrier damage.

The other test involves passage of dextran, a large carbohydrate, across the gut barrier. If the barrier is healthy, dextran can't penetrate. If dextran crosses, it indicates there's damage.

**Q: What's your take on the significance of these studies?**

**DN:** It's important to emphasize that the ideal way to prevent stress-induced performance problems is by minimizing the stress placed on pigs. However, when stress just can't be avoided and is thought to be the cause of poor performance, feeding BMD can help maintain average daily gain and feed conversion, thereby offsetting the economic impact of stress. It's also one of the few feed medications not considered by FDA to be medically important to humans, so it doesn't require a veterinary feed directive.

For more information, contact Daniel Nelson ([daniel.nelson@zoetis.com](mailto:daniel.nelson@zoetis.com)) or your Zoetis representative.

<sup>1</sup> Moeser AJ, et al. Weaning stress and gastrointestinal barrier development: Implications for lifelong gut health in pigs. *Anim Nutri.* 2017 Dec.;3(4):313-321.

<sup>2</sup> Ibid.

<sup>3</sup> Moeser AJ, et al. Gender and stress matter in pig gut health. *National Hog Farmer.* April 17, 2018.

<sup>4</sup> Moeser AJ, et al. The effects of bacitracin on gut health and performance in heat-stressed pigs. *Proceedings of the Am Assoc Swine Veterinarians Annual Meeting.* 2012 March;189-191.

<sup>5</sup> Moeser AJ, et al. Dietary bacitracin (Albac and BMD) improves ADG and FE in pigs in routine production environments (subjected to mixing and crowding stress). *J Anim Sci.* 2014;92(2).

<sup>6</sup> Moeser AJ, et al. The effects of bacitracin on gut health and performance.

<sup>7</sup> Moeser AJ, et al. Dietary bacitracin (Albac and BMD) improves ADG and FE.

**toolbox**

All trademarks are the property of Zoetis Services LLC or a related company or a licensor unless otherwise noted.

*Toolbox* is a series of interviews with veterinarians about their experiences managing antimicrobials, vaccines and other tools for swine health. It is produced by the editors of *Pig Health Today*® on behalf of the US Pork Business of Zoetis.

To contact *Pig Health Today*:  
[editor@pighealthtoday.com](mailto:editor@pighealthtoday.com)  
PIGHEALTHTODAY.COM

Copyright © 2019, Pig Health Today.

To contact Zoetis:  
888.963.8471  
ZOETISUS.COM/PORK

BMD-00011