



Our multifactorial approach to
zinc oxide (ZnO) replacement



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Zinc oxide (ZnO) is widely used as an essential nutrient in low dosages and as a treatment in high dosages (up to 2500 ppm) to prevent post-weaning diarrhoea in piglets.

Despite it being commonplace, zinc oxide also has some negative effects affecting antimicrobial resistance, absorption of critical macro and trace minerals, accumulation of zinc ions in vital organs, as well as various negative ecological effects.

It is for these reasons that as of June 2022, the use of zinc oxide at medicinal levels (above 150 ppm) in post-weaning diets will be officially banned within the European Union.

The challenge of replacing zinc oxide at medicinal levels

At Kemin, we believe in a multifactorial approach to replace therapeutic, high-level zinc oxide. We know there is a physiological need for zinc but we also know that increasing levels can harm the environment and animal health. Coupled with this is the fact that zinc oxide is not palatable and piglets consume less when zinc is present — negatively impacting gastrointestinal health and growth.

However, we also know that the low cost of zinc oxide makes finding a cost-effective alternative challenging. And to make things even more complex, every farm is unique and may require a different approach when it comes to replacing zinc oxide.



KEMIN A multifactorial approach to zinc oxide replacement

Hi, I am Ricardo Neto, pig Veterinarian and Technical Service Manager at Kemin.

Our solutions

We are committed to searching for unique solutions that work for you. That's why, through our extensive research on the topic and experience in the sector, we believe that a multifactorial strategy for zinc oxide replacement is best. This is because zinc oxide cannot be replaced with a single product alone.

Our multifactorial strategy aims at control postweaning diarrhoea and maintain growth performance shortly after weaning — without the use of zinc oxide. Therefore, it is important to support piglets through their dramatic diet and nutritional changes and to control the passage of undigested nutrients. To start with, diets needs to be fairly digestible and contain the necessary enzymes. Furthermore, we can implement our multifactorial strategy.

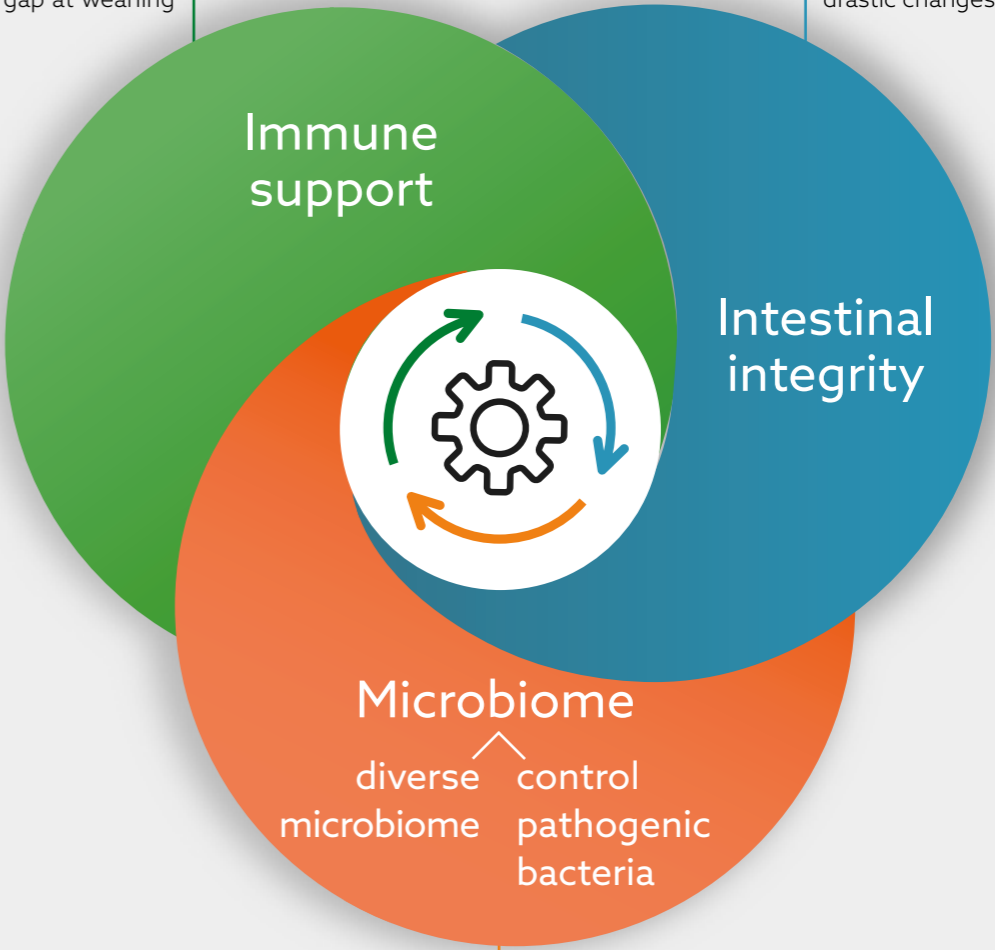
Our multifactorial strategy for zinc oxide replacement includes the use of:

BETA-(1,3)-GLUCAN

A β -(1,3)-glucan to support the immune system during the immunity gap at weaning

CALCIUM BUTYRATE

A slow release butyrate to improve intestinal tract integrity, tight junctions and nutrient absorption, which are under attack due to the drastic changes in diet



BACILLUS SPP

A *Bacillus* Sp. PB6., spore-forming microorganism has specific activity against certain potentially pathogenic bacteria favoring beneficial bacteria, to support a diverse microbiome

ORGANIC ACIDS

A microencapsulated blend of organic acids (calcium formate and citric acid) that can reach the intestine to manage enteric gram-negative bacterial challenges at weaning such as *E. coli*

Zinc oxide side effects and alternatives

We have identified various main effects that zinc oxide has demonstrated (as shown in several studies): antimicrobial effects, improved intestinal morphology, antioxidant effects and immune system priming. As such, we propose solutions that can be tailored to your specific needs on the farm:

IMMUNE SYSTEM MODULATION

Zinc oxide shows immune modulating effects. It reduces the expression of several pro-inflammatory cytokines while stimulating specific anti-inflammatory cytokine as well as downregulating the innate immune response. Consequently affecting intestinal inflammation when supplementing piglets with pharmacological levels of zinc oxide. Zinc oxide reduces the release of histamine, a key molecule for the pathogenesis of diarrhoea and inflammatory status in the intestine.

IMPROVED INTESTINAL MORPHOLOGY

Zinc is linked to the maintenance and functioning of the gastrointestinal tract. Several studies proved that pharmacological levels of zinc oxide increase the proliferation of enterocytes and villi height: crypt depth ratio. Zinc oxide also improves tight-junction expression, which is indicative of reduced intestinal permeability, and better intestinal integrity. Initially thought to have an antimicrobial effect, zinc oxide has proven to inhibit bacterial adhesion to cells, preventing the disruption of the intestinal tight-junctions.

MICROBIOME EFFECTS

Zinc supports the stability of the intestinal microbiome and favours its diversity. To replace zinc oxide, there are alternative solutions available to enrich the microbiome, for example, in our zinc oxide replacement trial CLOSTAT (together with ButiPEARL and FORMYL) succeeds to replace zinc oxide fully without any performance loss and with equal health results.

ANTI-MICROBIAL EFFECTS

Zinc oxide has been widely shown to have anti-microbial effects that have been shown to help reduce enteric gram-negative infections such as *E. coli* and *Salmonella*. Although it was found that zinc oxide's mode of action may not only be a direct antimicrobial effect, controlling the major enteric pathogens during this critical and transitional period is crucial for successful weaning.

Aleta™

Aleta is making the piglets more resistant to diseases, through its immune priming action. A unique beta-glucan, derived from algae (*Euglena gracilis*), serving as an immune modulator to improve animal health.

[READ MORE](#)

ButiPEARL™

An option to preserve intestinal integrity with the use of calcium butyrate using ButiPEARL, an encapsulated and highly concentrated calcium butyrate. The encapsulation allows for superior handling ease and sustained release along the intestinal tract.

[READ MORE](#)

CLOSTAT®

A unique, patented strain of *Bacillus subtilis* PB6. PB6 attacks and kills *Clostridia* and other pathogenic bacteria which can negatively impact the gastrointestinal tract. It also balances the microbiome.

[READ MORE](#)

FormaXOL™/ FORMYL™

A non-antibiotic tool to control enterobacteriaceae. Microencapsulation technology allows FormaXOL/FORMYL's* active ingredients to reach pathogens where they are in the pig's gut.

[READ MORE](#)

* Availability of the product may differ depending on your region.

To ensure a smooth transition at weaning without relying on high doses of zinc oxide, we need a holistic approach and we believe in using this to work towards increasing the resilience of piglets. Challenging post-weaning conditions such as diet and immunological changes, stress and different environments to which piglets are exposed, favour the intestinal growth of bacteria associated with diarrhoea. This makes it crucial to draw up a plan of action that can result in reducing the pathogenic load.

Want to learn more about our multifactorial approach to zinc oxide (ZnO) replacement? Watch the webinar on alternatives to AGPs and zinc oxide in the pig during the post-weaning period.

Presentation outline

- The development of the gastrointestinal tract in the commercial pig to weaning
- Alternatives to zinc oxide (ZnO):
 - Effect of age/weight of piglet for problem-free weaning
 - What are suitable alternatives?
 - When and how long should supplementation occur for?

Services for our partners

To ensure a profitable and sustainable business, thorough technical knowledge and understanding of available supportive tools is imperative. That's why Kemin not only offers highly efficient, science-based solutions to help you manage this intense challenge, but also close, tailor-made technical partnership. To build a successful mitigation strategy, we support you with excellent technical expertise, necessary research insights, with long-term guidance and training opportunities. Kemin's Technical team can help you to design an appropriate strategy.

Once you have decided to work with Kemin's solutions, we stand by your side every step of the way. The application can be tailored to your specific needs and technical expertise, application support and laboratory services are available to you.

Our technical team is always available for farm visits to design tailor-made solutions supporting you in your preventive strategies. Therefore, next to the technical expertise, we are able to offer you diagnostic services for various pathogens: from on farm test kits to laboratory analysis. Our teams are able to perform different antibody titer measurements on blood samples to ensure an effective vaccination or protection levels, as well as immunoglobulin detection in milk and colostrum to evaluate the immune status of the sow and her piglet.



The data driven knowledge, experience, and research insights are available to provide you with support, guidance and training. This will enable a correct evaluation of your challenge, the appropriate solution and approach or implementation. We have access to an international professional network with local specialists to address you in your language and fitted to your specific needs.

For you as a client, we go beyond the limit to support you and to ensure your success.



ZnO is a well-known tool to support young piglets during the challenging post-weaning period. The deadline of June 2022 is approaching when high dosages of zinc in animal diets will be banned. To assure optimal animal performance, farmers and veterinarians must find a way to take immediate action when potential treats like pathogens arise in their facilities.

On site diagnostics tools, like the Rainbow kit, can confirm immediately any potential treat from multiple pathogens. The reliability and high sensitivity of the kit helps farmers and veterinarians to make rational decisions. Kemin believes that point of care analysis will help animal professionals to take immediate action for prevention of economic losses due to pathogenic outbreaks on farm.

Kemin offers to his partners, on farm diagnostic toolkits and clinical expertise, and specific pathogen evaluation in laboratory facilities.



Want to know more?



VISIT OUR WEBSITE:

- [Weaning piglets without zinc oxide at high doses](#)
- [Aleta, immune modulator for optimal animal health](#)
- [ButiPEARL, encapsulated butyrate for better intestinal integrity and performance](#)
- [CLOSTAT, probiotic for better uniformity growth and survivability](#)
- [FormaXOL, Non-antibiotic solution for Enterobacteriaceae management](#)



READ MORE:

- [Technical document on the benefits of zinc oxide replacement in pre-starter and starter diets for piglets](#)



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