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## Animine Addresses Zinc Oxide Challenge with New Research Programme – INDUSTRY PERSPECTIVES

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Zinc oxide plays a huge role in swine animal husbandry globally, but restrictions being implemented around the world mean the feed additives industry is having stepping up to research solutions in this area.

One company doing so is Animine with their ZinCoSupp® project – a research programme bringing together some of Europe's leading universities to try and better understand the metabolic roles and modes of action of zinc oxide in piglets.

We spoke to Animine's President Stéphane Durosoy and R&D Director Arturo Piñon, as well as Professor Jürgen Zentek from the Freie Universität Berlin to better understand the current regulations regarding zinc oxide use, why Animine have invested in this project and the key aims and expected outcomes from this ambitious research programme.

**[Feedinfo] Can you give us an update on Animine's challenges and noteworthy developments this year?**

**[Stéphane Durosoy]** We at Animine are an independent supplier of trace minerals and 2020 has been a momentous year for us as we celebrated our 10-year anniversary. With this in mind we took the opportunity to intensify our investments and ambitions for the next decade. Of course, 2020 has been quite a disruptive year for many, given both pig (ASF) and human (COVID-19) virus pandemics, but we are glad to say our business has remained fast growing and our supply chain have not been disrupted. One thing that COVID-19 has done, is accelerate the digitalization of our company and we have further implemented our strategy to have industrial

and human resources based as close as possible to all local markets, which I see as a real positive for our business.

A key development in 2020, was the expansion our product offering. Until now we have had HiZox® which is a patented potentiated zinc oxide and CoRouge® a unique form of monovalent copper.



**Stéphane Durosoy**  
President  
Animine

At the end of November, we are launching our third product ManGrin®, which is an innovative source of highly purified feed grade manganese, meaning Animine will now offer a very consistent and complete product portfolio for pigs, poultry, ruminants and aquaculture.

**[Feedinfo] Can you provide an overview of the current status of zinc oxide usage in the EU and outside it?**

**[Stéphane Durosoy]** Only the pharmacological usage of zinc oxide in piglet diets is facing these restrictions. This means that the ban of zinc oxide in the European Union is restricted to medicated feeds which are prescribed by veterinarians. This does not apply to the nutritional usage of zinc oxide which is routinely included in premixes and remains the dominant source of zinc utilised by the feed industry.

Medicated zinc oxide was diversely utilised in European countries for over 15 years. Unlike feed regulation, veterinary regulation is country specific. Dutch feed manufacturers were never authorised to use pharmacological zinc oxide in piglet diets. In France it was only in 2016 that the authorities gave permission for medicated use of 1 source of zinc oxide and since then less than 20% of pig farmers have adopted it. In January 2021 French authorisation will expire, preceding the ban at EU scale planned for June 2022. Denmark is also a unique country regarding pharmacological use of zinc oxide where the Danish pig industry, under governmental pressure, initiated in 2017 an ambitious national programme to reduce the dosage of zinc oxide, despite it being widely popular in the country. From an initial level of 3 kg/T of ZnO, they recommended half the dosage and it is estimated that around 25% of Danish pig producers have implemented this. For many other EU countries with a long history of pharmacological zinc oxide in piglet feeds including Spain, Germany and the UK, restrictions are challenging.

Outside the EU, the situation is accelerating too. China already implemented in 2018 a drastic reduction of authorised zinc supplementation level (from 2250ppm Zn to 1600ppm) in piglet diets. Pharmacological zinc oxide is under scrutiny in many other countries in Asia and Americas so we can expect new restrictions to be applied over the coming years.

**[Feedinfo] What is Animine's position on replacing pharmacological zinc oxide?**

**[Stéphane Durosoy]** Pig producers currently face two critical challenges: reducing antibiotics and zinc oxide dosage. We know a significant number of farms rely on pharmacological zinc oxide to prevent post-weaning diarrhoea. Dutch and French examples show that having high performance levels is possible without medicated zinc oxide, but this situation is the result of a continuous improvement. A proper assessment of risks for post-weaning diarrhoea is the starting point, with on-farm audits and a multifaceted approach including biosecurity, housing, animal management, genetic profile, feeding programme, water quality, and vaccination. HiZox®, our potentiated zinc oxide, is a tool for digestive security. Feed formulators also have other dietary tools including having an appropriate protein level, fibre formulation, and additives such as CoRouge® (monovalent copper oxide) to improve intestinal health.

In my experience, feed companies should be cautious about products sold as “alternatives to pharmacological zinc oxide” as these ‘magic solutions’ are not always supported by robust research. So, in the quest for a pharmacological zinc oxide replacement we should not forget that “zinc” can be part of the solution. Feed grade zinc oxide products have very different physical and chemical properties, which has been shown in various experiments (for example Cardoso et al, Powder Technology 2020). Looking at our own products, HiZox® is a nutritional source of bio accessible zinc benefiting from additional technological features (e.g high specific surface area), which plays a critical role in intestinal function and gut microbiota. We believe that HiZox® is the most documented alternative to pharmacological zinc oxide, and this will be intensified with the launch of our ZinCoSupp® research programme.

**[Feedinfo] So can you tell us about what your ZinCoSupp® project, its objectives and why it was set up?**



**Arturo Piñon**  
R&D Director  
Animine

**[Arturo Piñon]** Animine's scientific credibility relies on internal resources and extensive collaborations with external specialists. We have boosted our R&D activities by restructuring our innovation process and allocating a very ambitious 2020 budget. This budget boost is dedicated to experimental activities carried out in partnership with worldwide recognised universities, so during 2020 our R&D team has been actively mobilised to build several research collaborations that aim to develop analytical insight into trace minerals.

In relation to the ban of pharmacological zinc oxide, experimental activities conducted by Animine have been looking to anticipate this regulatory evolution for many years. Hence why this year we also decided to launch our ambitious PhD research programme ZinCoSupp®.

This name has a dual meaning and stands for SUPPpression of pharma ZnO but also for SUPPLEMENTation of the right zinc oxide source and at the right dosage. The programme is targeting the understanding of the metabolic roles and the mechanism of action of zinc supplementation in piglets at both, nutritional and pharmacological inclusion levels.

The project brings together the work of several well recognized Universities from western Europe (Universities of Berlin, Bologna, Leeds, Milan, Kiel & Ghent). Under the guidance of prominent scientists in the fields of trace minerals and animal nutrition, these universities will drive four different PhD thesis projects for Animine. The main goal of this large-scale programme is to offer solutions to the upcoming regulatory challenge in the EU by highlighting benefits of providing 120 ppm of zinc from a potentiated source HiZox® on

gut morphology, function and health versus other zinc sources available. In addition, a complementary PhD thesis project led by the University of Hohenheim and with contribution from the University of Georgia (USA) will study HiZox® with a particular focus on the interaction among dietary zinc and phytase efficacy on phosphorus release from phytic acid.

**[Feedinfo] Professor Zentek, as a leading academic in this field can you summarise what we currently know about the mode of action of zinc oxide and where gaps in our knowledge lie?**

**[Jürgen Zentek]** We know zinc oxide is used worldwide in high concentrations to prevent or reduce diarrhoea in weaning piglets, but the mechanisms of action are manifold and refer on the one hand to the intestinal microbiota and also to numerous processes in the intestinal mucosa. We see high doses of zinc oxide have a functional impact on the intestine and can reduce the secretion of chloride and thus of water.

It is also increasingly evident that the intestinal barrier and the gut associated as well as the general immune system are affected. We see that numerous regulatory mechanisms react on different levels of zinc intake. Therefore, the findings from projects like ZinCoSupp® are extremely valuable to narrow down the mechanisms of action more precisely and help to develop considerations on alternatives to the pharmacological dosage of zinc oxide.



**Professor Jürgen Zentek**  
Freie Universität Berlin

**[Feedinfo] How do you expect the outcomes of the project to be used and what are the implications of this knowledge globally?**

**[Arturo Piñon]** With such a level of scientific expertise converging in a common goal of looking to clarify the modes of action of zinc oxide, we are expecting really positive outcomes. The findings will be valuable for today and tomorrow's swine production systems globally. It will help to prepare strategic plans for a shift towards more sustainable production systems, while limiting the occurrence of digestive disorders around weaning and maintaining high productivity levels.

One key area to highlight is we are aiming to find new evidence on the effects of zinc according to its speciation state along the digestive tract. This could be associated with different events, from the formation of a "zinc protecting biofilm" on the mucosa to the reduction of the amount of specific undesired metabolites from bacterial origin that have proinflammatory activities in the gut.

**[Feedinfo] So finally how can people follow the progress and findings from the project?**

**[Stéphane Durosoy]** For general public and professionals, we plan to provide updated information on the ZinCoSupp® programme. They will be able to follow our progress through communication in scientific congresses but also visiting our website where we created a special webpage about ZinCoSupp®. We are also hosting a webinar on December 15th (9am CET) and invite any interested nutritionists, veterinarians or scientists to join us to learn more about this issue. We are excited about the potential for this research programme and hope others are interested in learning more about the findings over the coming years.

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