Zinc oxide withdrawal: supporting piglet physiology at weaning

Weaning is a critical period for piglets during which they have to cope with many stresses. The first one, of course, is the psychosocial stress undergone by the piglet: it is separated from its mother and litter mates, only to be mixed up with piglets from other litters.

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This change of buildings, bringing piglets into a different environment from the farrowing house, as well as all the operations carried out during weaning (weighing, vaccination, moving or even transportation) are all discoveries for the young, weaned piglet.

Then there is the physiological stress brought by the dietary transition: suckling is replaced by solid feeding containing less digestible proteins than milk.

All these stresses will cause a disruption of the cellular homeostasis, leading to a higher production of free radicals during this period (Fig. 1).

In the intestine, the oxidative stress will amplify local inflammation, particularly by oxidising phospholipids in the cellular membranes of the enterocytes, which are still fragile due to the young age of the piglets at the time of weaning, when the intestinal mucosa is still developing.

At this stage, the microbiota is not yet established and will be modified by the dietary transition.

The stress of all these changes at the time of weaning often results in a reduced consumption of feed in the first few days after weaning.

This phenomenon accentuates, in turn, the risk of dysbiosis due to the physico-chemical variations in the digestive tract (pH, enzymatic secretions, etc).

Finally, the third type is an immune stress. Weaning takes place in the middle of the immune gap, which is represented by the rapid decrease in maternal colostral antibodies, and the low level of antibodies synthesised by the piglet itself.

Weaning is therefore a period where the health stakes are high for piglets: their organisms are in the middle of a digestive adaptation, in terms of enzymatic secretions, intestinal structures and microbiota that are still immature, in a period of high oxidative stress and with a low level of total antibodies.

But it is also a period with high economic stakes for the farmer: the conjunction of all these parameters facilitates the appearance of digestive disorders or the development of pathologies that will strongly impact the subsequent performance of the piglets and therefore their profitability, whereas pigs at this stage are having the lowest feed conversion ratio in their life.

Natural solution to support piglets

For many years, the use of antibiotics, used both to prevent certain diseases and as a growth promoter, and the use of pharmaceutical doses of zinc or copper have been common answers to these challenges.

Today, consumer demand and governmental regulations are requiring sustainable alternatives to the traditional chemical solutions, to prevent antibiotic resistance development, as well as prevent soil and water pollution.

After several years of research, Biodevas has developed SINEA, a natural solution to support piglets in this uncertain period of weaning, with the ambition to promote feed consumption and to optimise performance, while promoting the stability and positive orientation of the microbiota.

Four phytogenic cores composed of plant extracts act in synergy to support and strengthen the physiology of piglets by specifically addressing the four major challenges faced by piglets during weaning:

- The management of oxidative stress induced by abiotic and biotic stresses, by stimulating the NRf2 pathway and therefore the production of primary antioxidant enzymes (SOD, GPx, Catalase) by the piglet.
- Management of gut inflammation by modulating inflammation proteins (NF-kB).
- Strengthening of the integrity of the intestinal mucosa by increasing tight junctions.
- Finally, a more efficient immune system through improved antigen presentation and facilitated transmigration.

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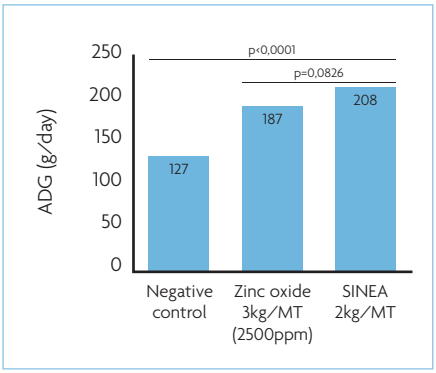

Fig. 1. Average daily gain (ADG) during the prestarter period (28-42 days old) (p<0,0001).

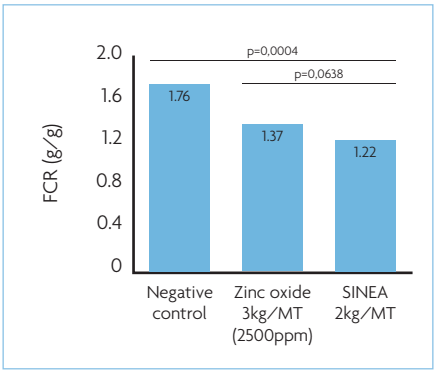

Fig. 2. Feed conversion ratio (FCR) during the prestarter period (28-42 days old) (p=0,0004).

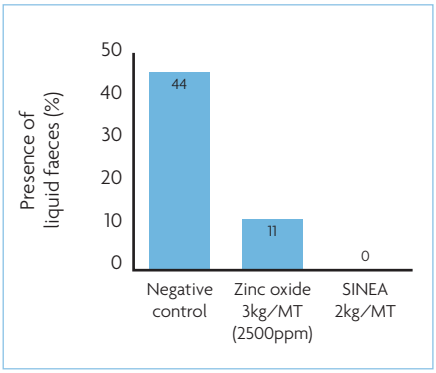

Fig. 3. The presence of liquid faeces (%). Total post-weaning (28-70 days old) (p=0,0411).

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Field trial results

Tested in Spain in commercial farming conditions and under the supervision of independent experts (Pig Champ), SINEA proved to be a relevant and performing alternative compared to zinc oxide. Indeed, the trial was carried out on three batches of 126 piglets, each from 28-70 days of age.

The control batch received a starter feed without supplementation, a second batch was fed the same starter feed supplemented with 2500ppm zinc oxide (3kg/T) and the trial batch was supplemented with 2kg/T SINEA. For all three batches, the starter was fed from weaning to 28 days of age and for a duration of 14 days. At 42 days of age, the three batches were then fed the same second age feed without any supplementation until 70 days of age.

Weighing and scoring of the faeces were carried out to evaluate the effectiveness of SINEA both on the performance and on the stabilisation of the microbiota. The trial confirmed the positive effect of zinc oxide on piglet performance.

However, SINEA resulted in similar or even better performance in FCR (feed conversion ratio), ADG (average daily gain) and GFR (growth to feed ratio) at the end of the first age period. SINEA boosted piglet feed intake from the first week of life, resulting in better performance but also better quality of manure.

Indeed, over the whole duration of the trial, the SINEA batch never presented liquid excreta, whereas in the control batch (44%) diarrhoea persisted and the ZnO batch experienced a rebound effect when supplementation was stopped during the transition to the second age. This also reduced the need for veterinary treatments by 87% compared to the control. ■