CAPMAG ZN

TECHNICAL BULLETIN #5

CAPMAG® ZN'S MODULATING EFFECT ON GUT MICROBIOTA – E.COLI CHALLENGE (IN VITRO)

INTRODUCTION

Antimicrobials have been, and still are, used worldwide as growth promoters, acting in preventing post-weaning diarrhea in piglets (PWD) which is responsible for piglet mortality, diarrhea and reduced growth rate (Rhouma et al., 2017). This medication has been banned in some areas and replaced by ZnO at pharmacological levels, which is another way to decrease pathogenic bacteria infections and PWD (ANSES, 2018).

Among these pathogens, one of the most problematic bacteria is the enterotoxigenic E.coli (ETEC). The earlier the piglets are weaned, the greater the challenge by this bacteria (McLamb et al., 2013). In Europe, the use of Zn is now limited to 150 ppm Zn in complete diet for piglets. Therefore Europe is facing a big need to fin sustainable alternatives to the use of high levels of ZnO for gut health.

The aim of this trial is to assess on **CAPMAG® Zn**'s potential modulating effect on E.coli growth, compared to ZnO.

MATERIAL & METHODS

The trial was conducted in Roullier Innovation Center in Saint Malo, France, using the "spot method" : ZnO and **CAPMAG® Zn** treatments were incorporated at two different dietary levels : 100 or 2500 ppm Zn for each product, into the nutrient medium (agar). E.coli was inoculated on the plates and bacterial growth was assessed by measuring colony size at 7 days (Figure 1). This protocol allowed to compare the inhibitory effect of **CAPMAG® Zn** to ZnO against E.coli.

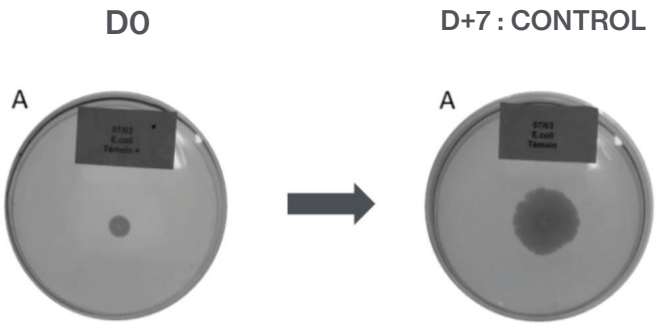

Figure 1: E.coli colony growth at D0 and D7 - control treatment, without zinc

RESULTS & DISCUSSION

The control group didn't show reduction in bacterial growth.

Compared with the control group, ZnO at 100 ppm Zn reduced the colony size by 20% and ZnO at 2500 ppm Zn by 54%. **CAPMAG® Zn** at 100 ppm Zn decreased bacterial growth by 36% and 44% when added at 2500 ppm Zn.

In comparison with ZnO at 2500 ppm Zn, a nutritional level of ZnO (120 ppm Zn) lowered the bacterial growth by 58% and **CAPMAG® Zn** at 120 ppm Zn decreased the colony size by 72%. At 2500 ppm Zn, **CAPMAG® Zn** diminished by 82% the E.coli growth.

Of particular concern is that **at 100 or 2500 ppm Zn, CAPMAG® Zn can inhibit E.coli growth**, there is **no dose-effect** with our product.

Table 1 : Inhibitory effect of different Zn sources on E. coli colony size after 7 days

PRODUCT	QUANTITY (ppm Zn)	SIZE OF THE COLONY D+7 (cm^2)	% decrease in colony size vs Control	% decrease vs ZnO at 2500 ppm
Control	/	4.45 ± 0.76 c	/	/
ZnO	100 ppm	3.56 ± 0.40 bc	20%	58%
	2500 ppm	2.06 ± 0.18 a	54%	100%
CAPMAG Zn	100 ppm	2.86 ± 0.18 ab	36%	72%
	2500 ppm	2.51 ± 0.23 ab	44%	82%
P-value		0.000291		

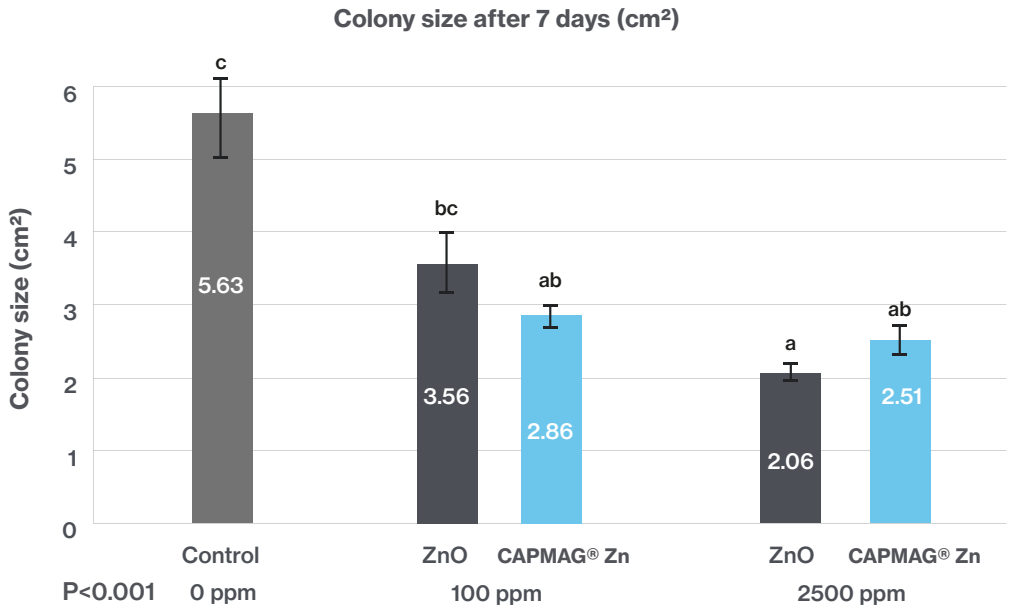

Figure 2: Inhibitory effect of different Zn sources on E. coli colony size after 7 days

CONCLUSION

In this in vitro test, the antimicrobial properties of CAPMAG® Zn are demonstrated against E.coli.

This has to be deeply investigated with in vivo tests.

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