

BACKGROUND

- Due to environmental concerns, the European Union plans to ban pharmacological levels of ZnO usage in nursery pigs in 2022. Therefore, an alternative strategy needs to be put in place when ZnO is prohibited
- Pharmacological levels of zinc oxide (ZnO) are widely used in weaning pig diets to promote growth and prevent post-weaning challenges, however, this practice is not environmentally sustainable
- Zn methionine hydroxy analogue chelate (Zn-MHAC, MINTREX® Zn, Novus International Inc., St. Charles, MO) has been proven to be more bioavailable in pigs, in comparison to ZnO

OBJECTIVES

Evaluate supplementation of 100 ppm Zn as Zn-MHAC on growth performance, Ca and P digestibility, and gut morphology in nursery pigs in comparison to 2000 ppm Zn as ZnO in the first 4 weeks post-weaning.

MATERIALS AND METHODS

ANIMALS AND EXPERIMENTAL DESIGN

A total of 288 weaning barrows (BW = 5.71 ± 0.81 kg) were allotted to 1 of 4 treatments using a randomized complete block design with 18 replications per treatment and 4 pigs per replicate. The 4 dietary treatments were arranged in 2 × 2 factorial design

Trt	Zn sources	Zn levels in phase 1, 2 and 3 diets, mg/kg	Phytase ² , FTU/kg
1	ZnO	2,000, 2,000, 100	0
2	ZnO	2,000, 2,000, 100	500
3	Zn-MHAC ¹	100, 100, 100	0
4	Zn-MHAC	100, 100, 100	500

¹Zn-MHAC represents Zn methionine hydroxy analogue chelate (MINTREX® Zn), is manufactured by Novus International Inc., St. Charles, MO.
²Phytase used in this study is a commercial feed-grade phytase, with analyzed activity of 6,033 FTU/g.

- Typical nursery diets were formulated to meet nutrient recommendations by NRC (2012)
- Pigs were fed their respective experimental diets from d 0 to 42 post-weaning, with d 0 to 14 as phase 1, d 14 to 28 as phase 2 and d 28 to 42 as phase 3
- Fecal samples were collected via grab sampling from each pig in each pen from d 24 to 26
- One pig from each pen with a BW close to the average BW of the pen on d 42 was selected to collect duodenum, jejunum and ileum tissue samples followed by euthanasia

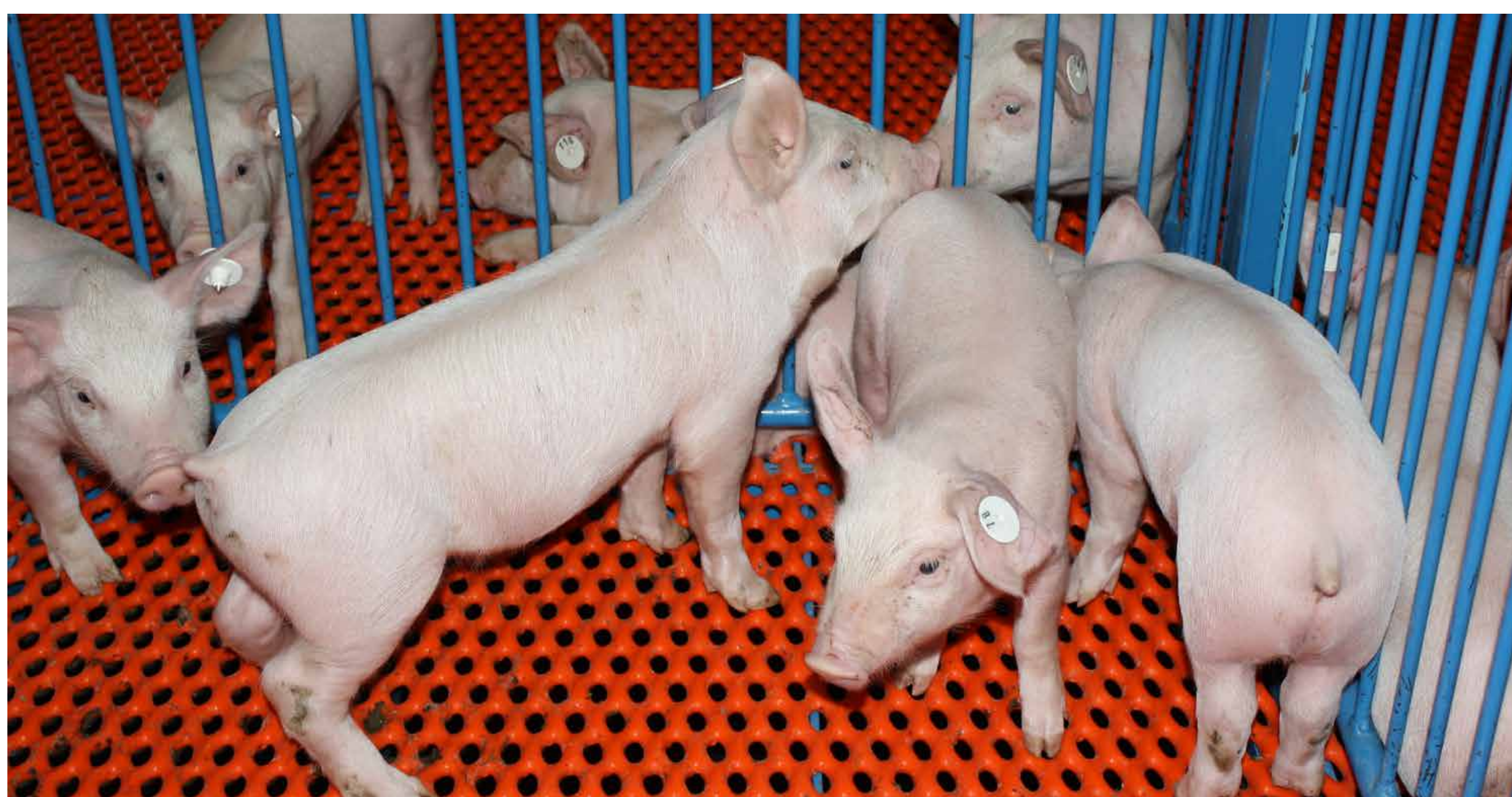
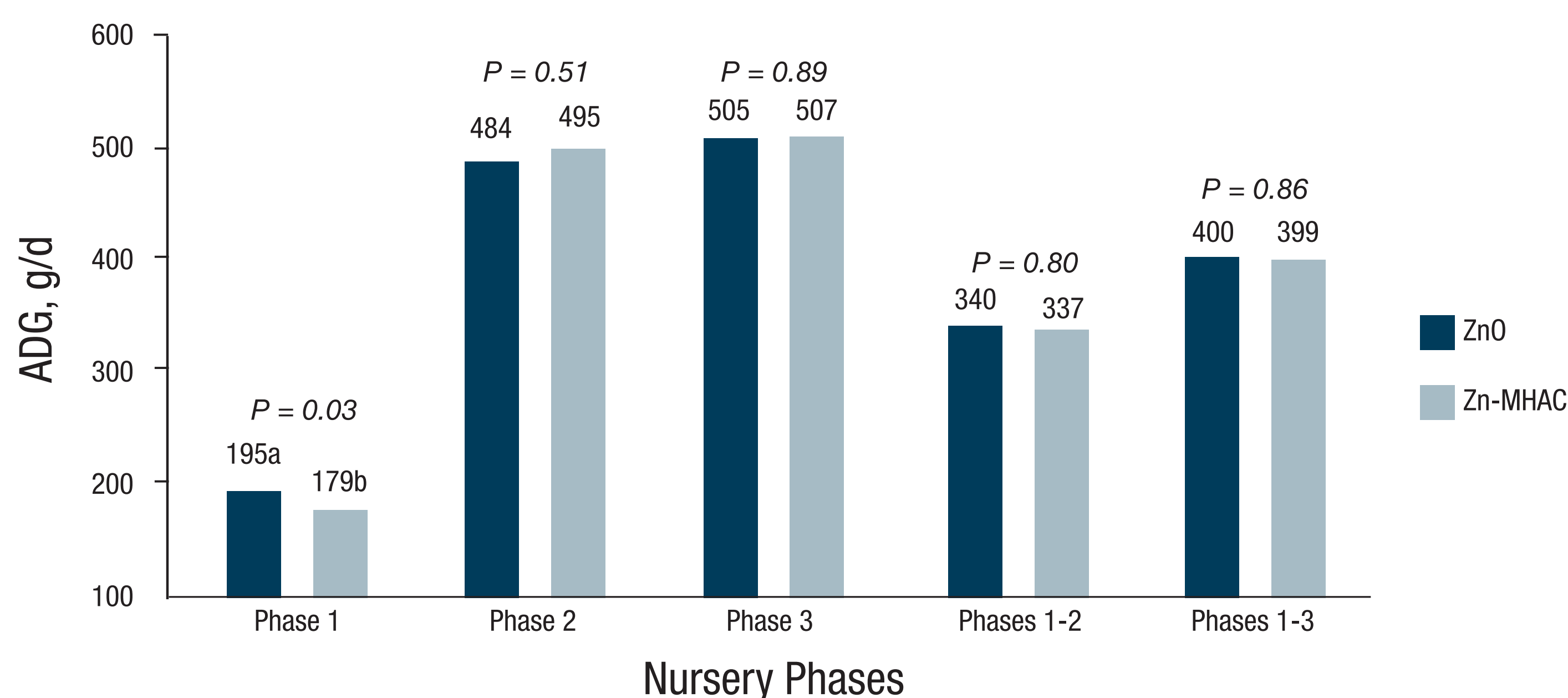
MEASUREMENTS

- Body weight and feed intake were recorded in order to calculate ADG, ADFI and G:F
- Fecal scores were recorded daily for each pen based on a 5-scale system: 1 = normal hard feces; 2 = slightly soft feces; 3 = soft, partially formed feces; 4 = loose, semi-liquid feces; 5 = watery, mucous-like feces
- Number of dead pigs in each pen was recorded to calculate mortality rate
- Small intestine samples were used for morphometry measurements
- Feed and fecal samples were analyzed for dry matter, Ca and P concentrations

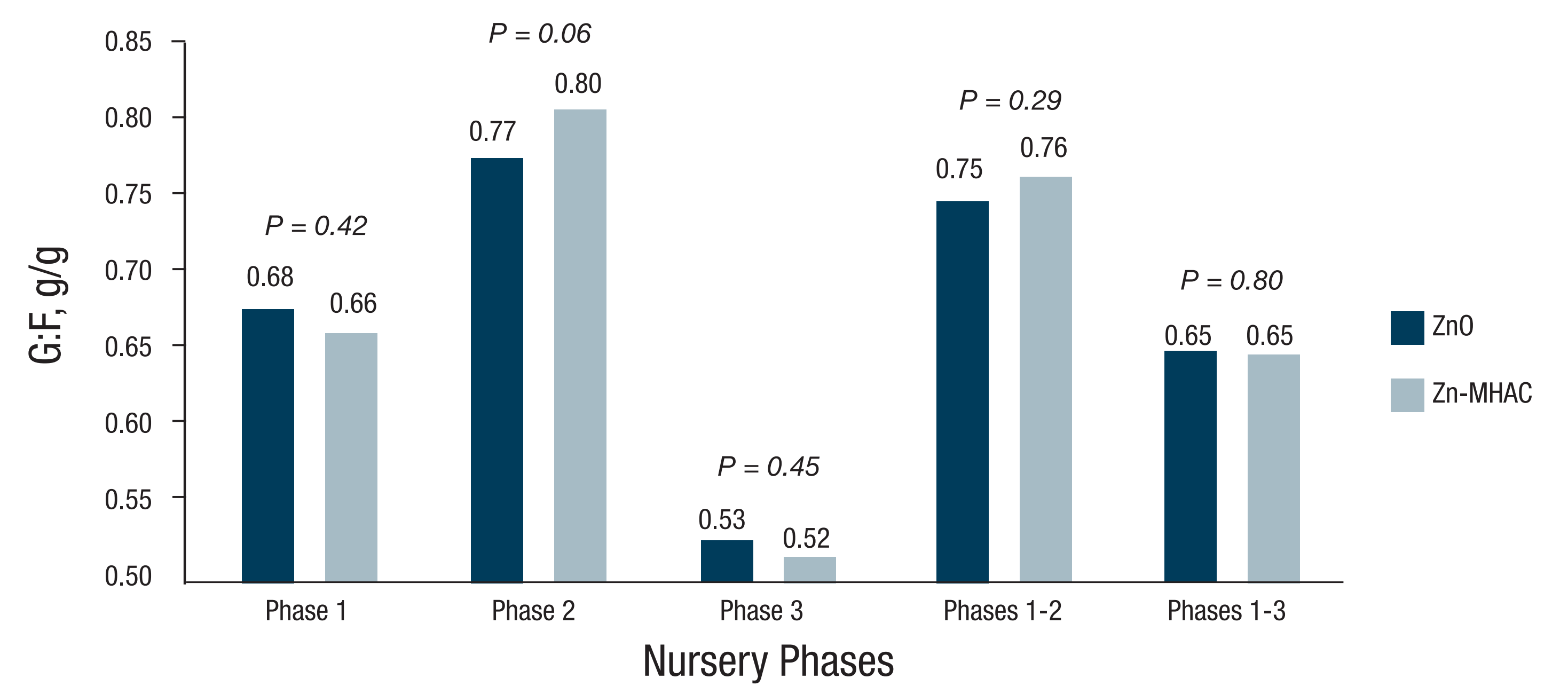
STATISTICAL ANALYSIS

- The GLIMMIX procedure of SAS was used to analyze all data
- Pen served as the experimental unit
- $P \leq 0.05$ was considered as significant and $0.05 < P \leq 0.1$ was considered as a trend. Only data with statistical significance or tendency were presented with the exception of fecal score and mortality rate

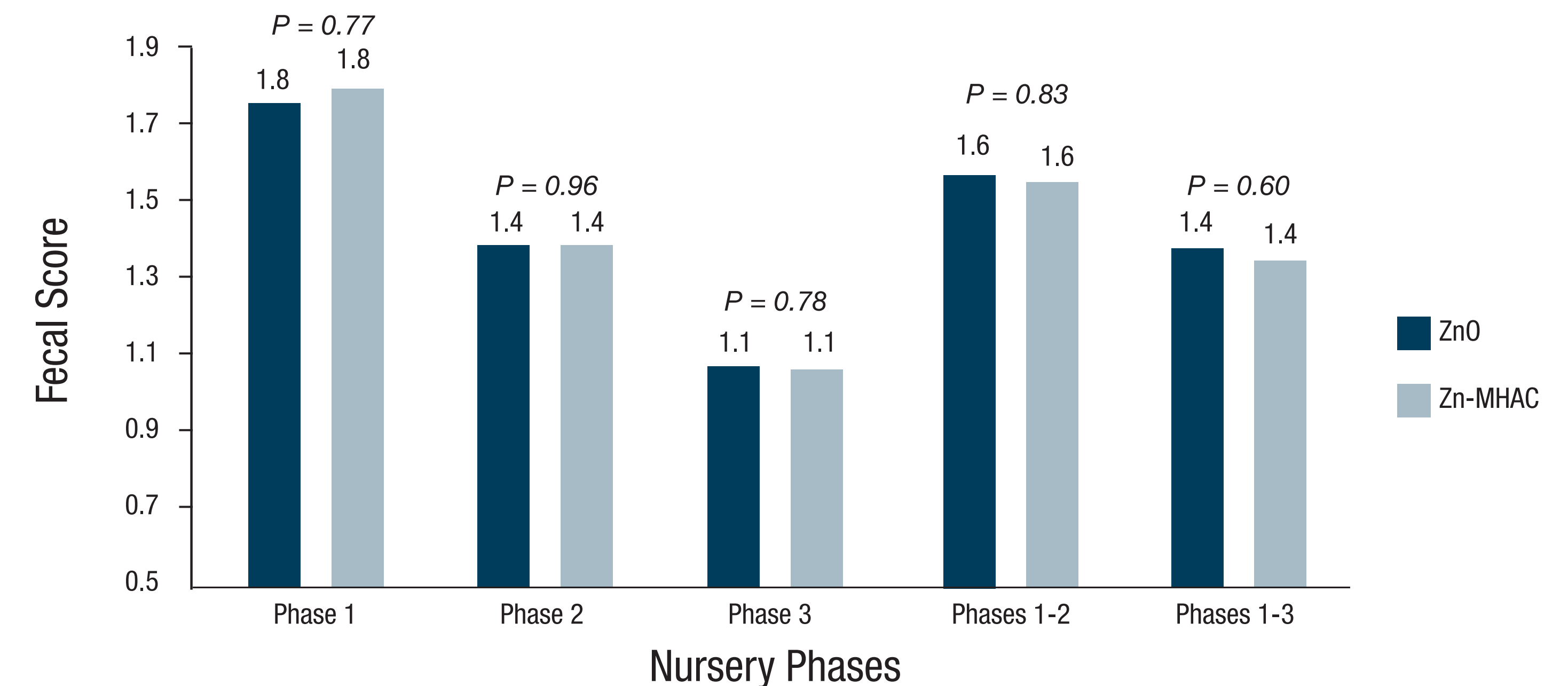
Zn sources on ADG



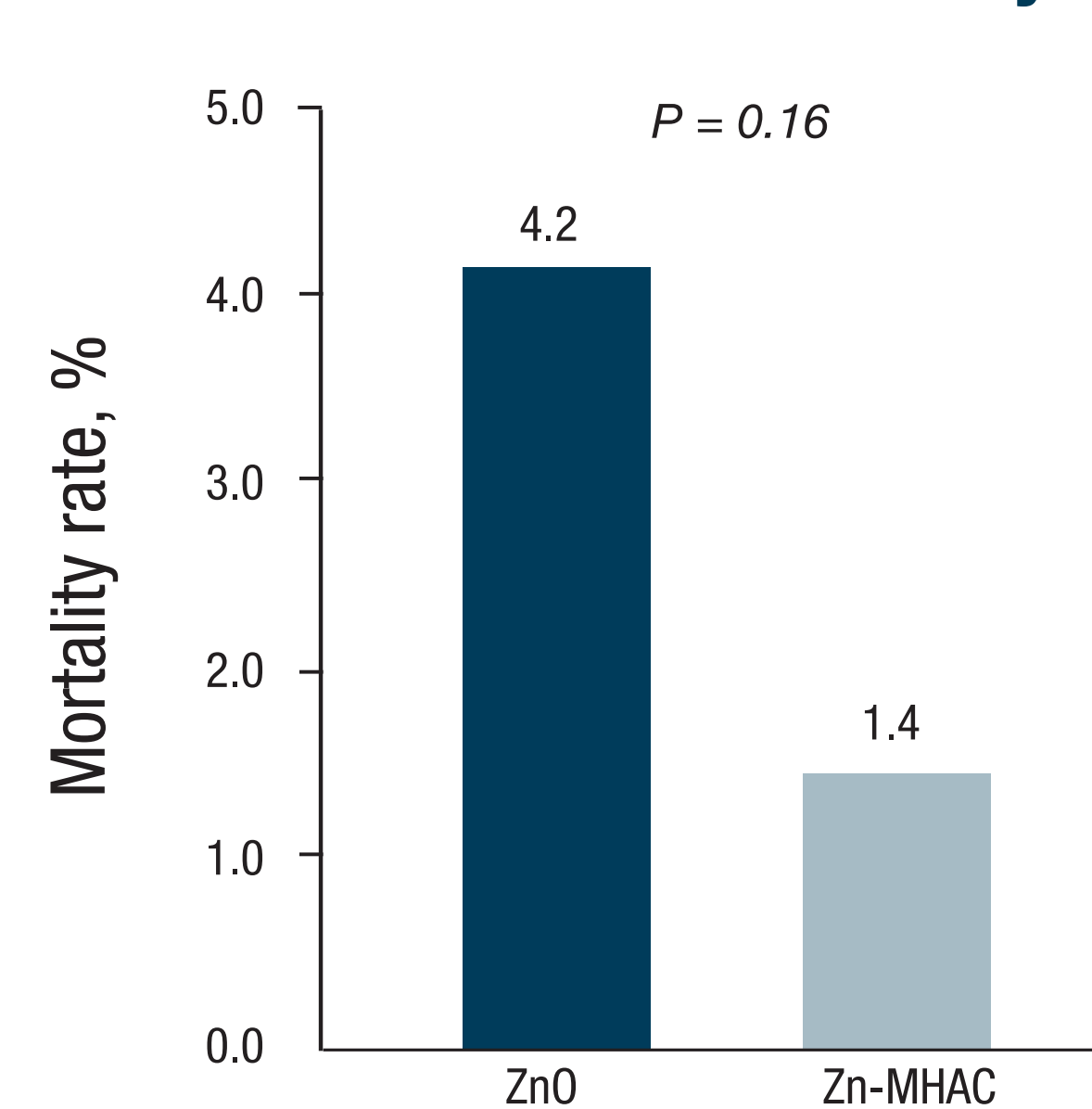
Zn sources on G:F



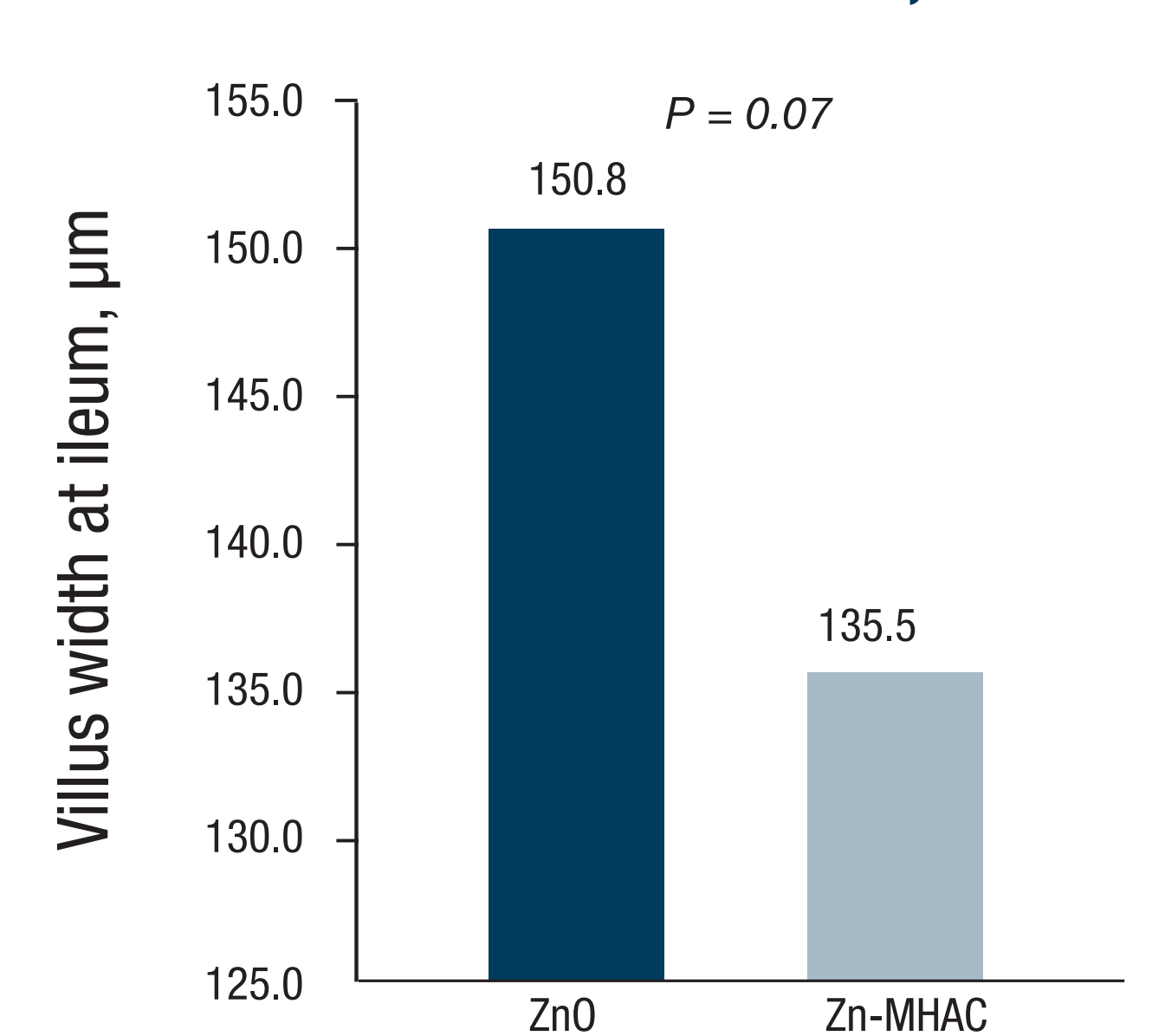
Zn sources on fecal Score



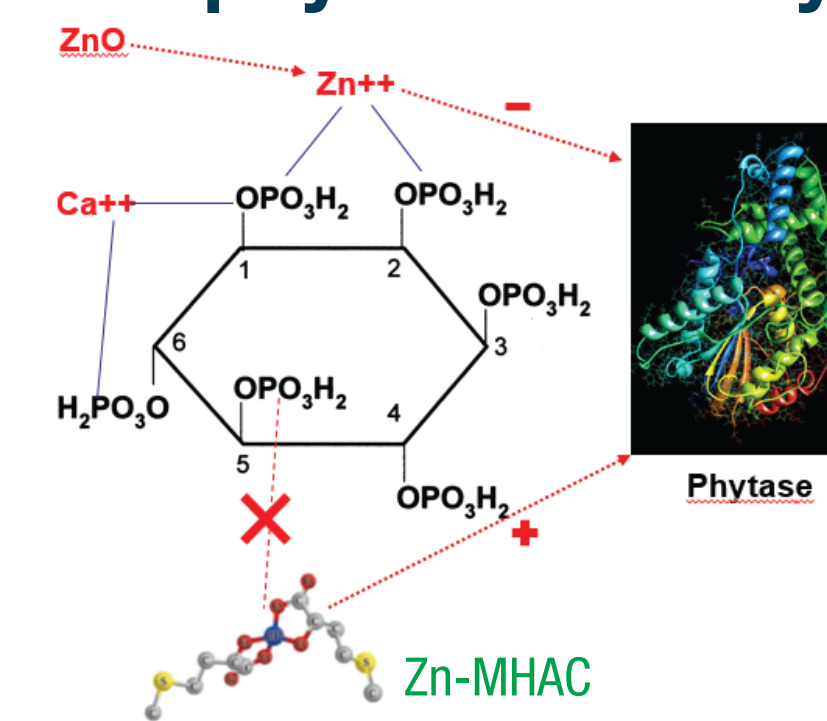
Zn sources on mortality rate



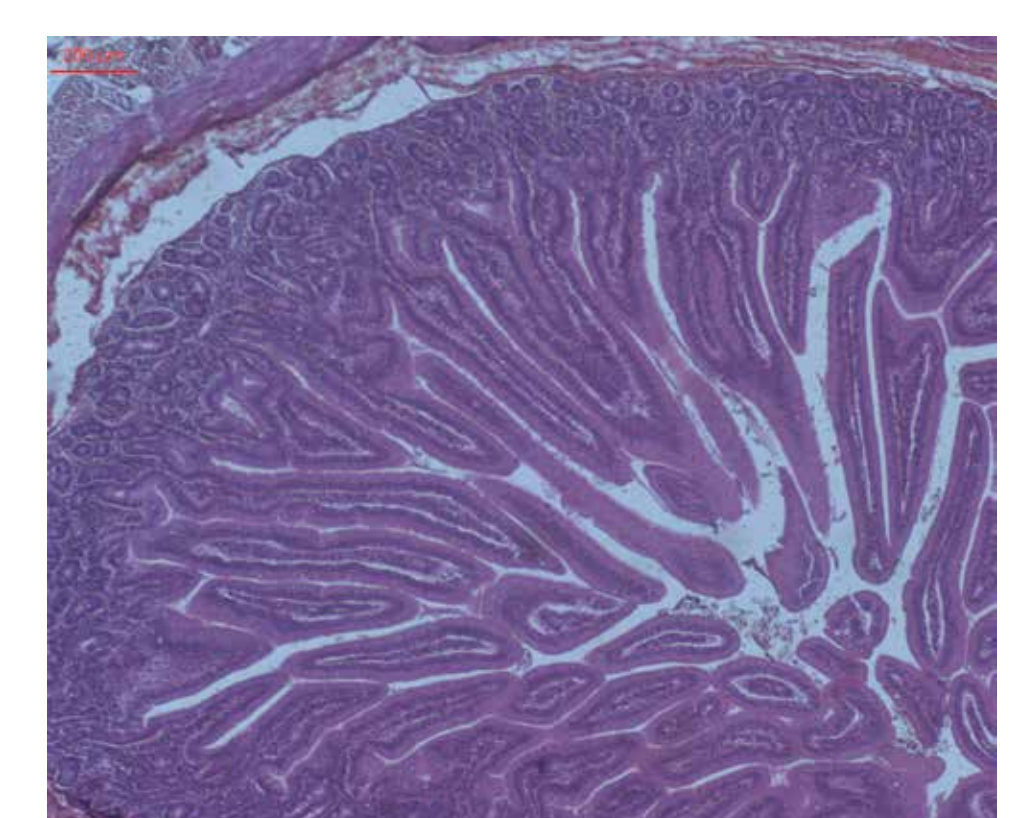
Zn sources on villus width, d 42



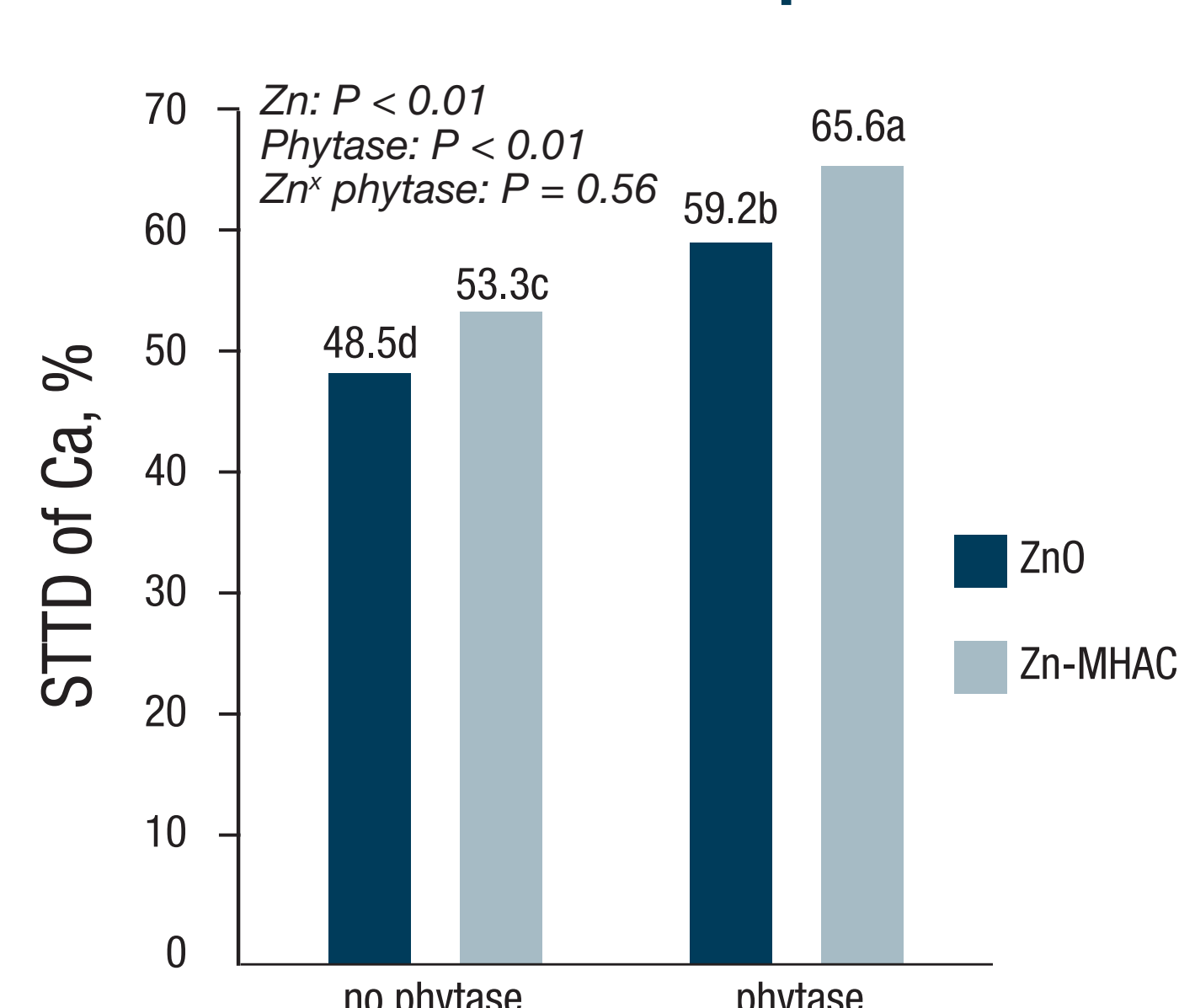
Zinc & Phytate interaction on phytase efficacy



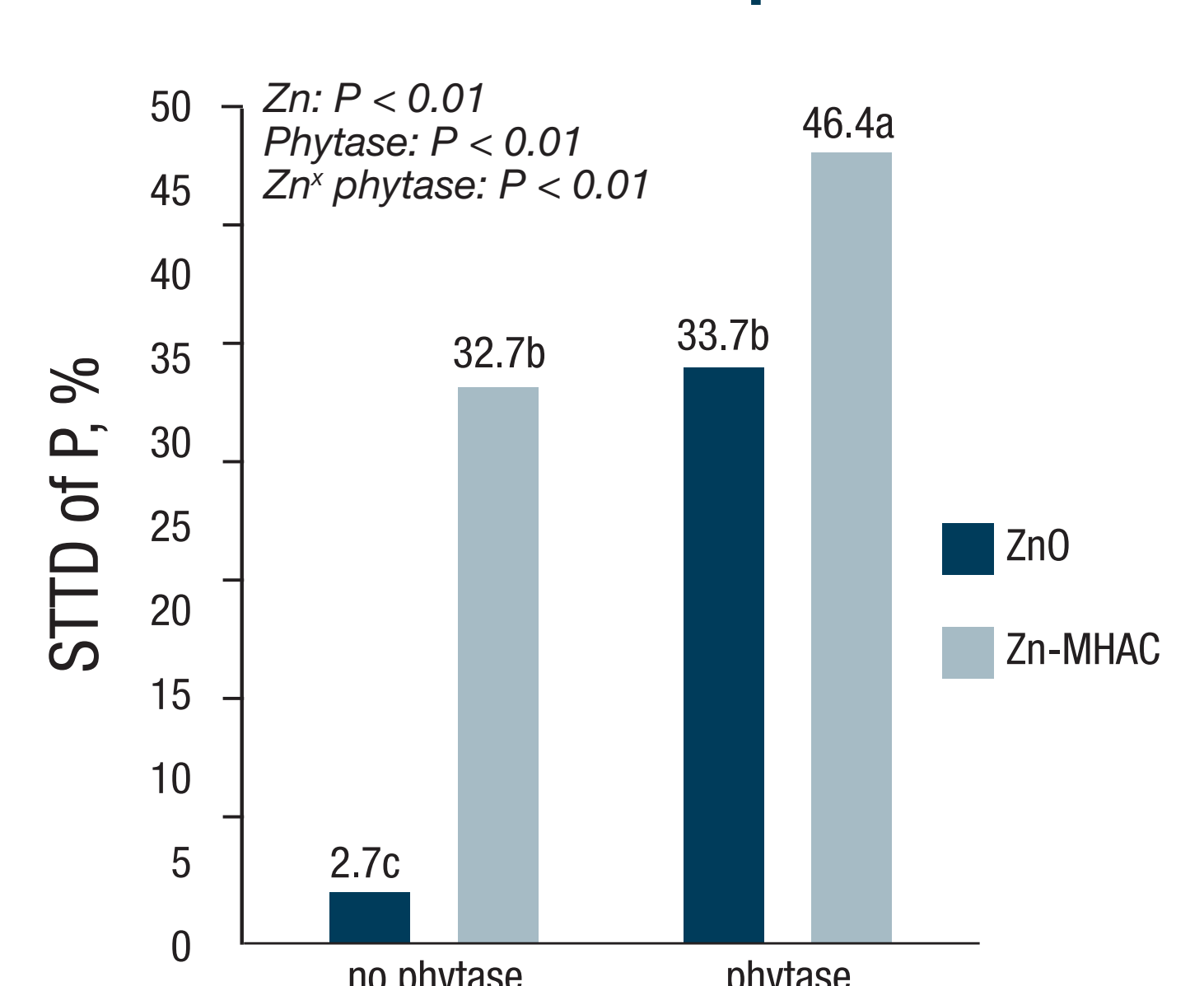
H & E stained ileum



Zn sources and phytase interaction on STTD of Ca in phase 2



Zn sources and phytase interaction on STTD of P in phase 2



SUMMARY

The beneficial effect of pharmacological levels of ZnO (2000 ppm Zn) was only realized in the 2 weeks post-weaning, when compared to lower Zn levels (100 ppm) supplied by Zn-MHAC. However, likely due to enhanced gut morphology and improvements in Ca and P digestibility, pigs supplemented lower levels of Zn from Zn-MHAC exhibited no differences in performance in phase 2 and 3 than pigs supplemented with high levels of ZnO.

IMPLICATIONS

Supplementing lower levels of Zn from Zn-MHAC, a more bioavailable source, could be an alternative to pharmacological levels of ZnO in nursery feeding program, and support the performance and health of nursery pigs while allowing those in the EU to be within future regulations.