



# Technical Literature

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## The effect of encapsulated butyric acid and zinc on performance, gut integrity and meat quality in male broiler chickens<sup>1</sup>

### Abstract

This study evaluated the impact of encapsulated butyric acid and zinc (ButiPEARL® Z) on performance parameters, gut integrity, and meat quality during heat stress in male broiler chickens reared to 47 days of age. Day old chicks (n=448) were randomly assigned to two treatments (16 pens/treatment; 14 birds/pen). From day 29 to day 47, broilers were subjected to cyclic heat stress (HS). On day 28 (before HS) and on day 32 (4 days after HS), intestinal samples were taken from eight birds/treatment, and intestinal permeability was measured. On day 47, birds were processed, and breast fillets were scored for woody breast (WB). Performance was collected up to day 47. ButiPEARL Z showed significantly higher feed intake and body weight gain (BWG) than the control at day 47 (P<0.05). During the HS period, ButiPEARL Z showed significantly higher BWG compared to the control (P<0.05). At day 47, ButiPEARL Z showed a numerical improvement on overall feed conversion ratio (FCR) of four points when compared to the control. Additionally, intestinal macromolecule permeability of ButiPEARL Z was numerically lower than the control, which indicates a more intact tight junction in the ButiPEARL Z birds.

### Introduction

ButiPEARL Z combines two unique and powerful molecules — butyric acid and zinc — to help improve intestinal health synergistically in poultry. The proprietary MicroPEARLS® encapsulation technology behind ButiPEARL Z allows for molecule release throughout the small intestine.

Previous work has shown that ButiPEARL Z improves growth performance in broilers.<sup>2,3</sup> However, the effect of ButiPEARL Z on heat-stressed broiler chicken performance, gut integrity, and meat quality had yet to be evaluated. The present study evaluated the impact of ButiPEARL Z on performance and gut integrity during heat stress in male broiler chickens reared to 47 days of age.

### Materials and Methods

Day-old, male broiler, Cobb 500 were randomly assigned to one of two treatments (16 pens/treatment; 14 birds/pen): a control (no butyric acid supplementation) or ButiPEARL Z (1lb/ton). Broilers were raised until 47 days of age. The corn-soybean based commercial type basal diets contained salinomycin sodium 60 g/ton, BMD® 50 g/ton and phytase. Diets were made for three growth phases: starter (0-14 days), grower (15-28 days) and finisher 1 (29-47 days). The diets and water were provided ad libitum, and birds were raised to 47 days. The building temperature range was maintained at an appropriate temperature for the age of the birds until day 28. From days 29 to 47, broilers were subjected to cyclic heat stress by exposing them to 28 ± 2 °C during the day and 22 °C at night.

Body weight, body weight gain (BWG), feed intake, and feed conversion (FCR) were recorded on days 0, 14, 28, 42, and 47 (data not shown for d14, 28, and 42). At day 28, before HS, and at day 32 (4 days of heat stress), jejunum sections were taken from 8 birds/treatment and cultured in Ussing chambers to determine the intestinal permeability.



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## Results and Discussion

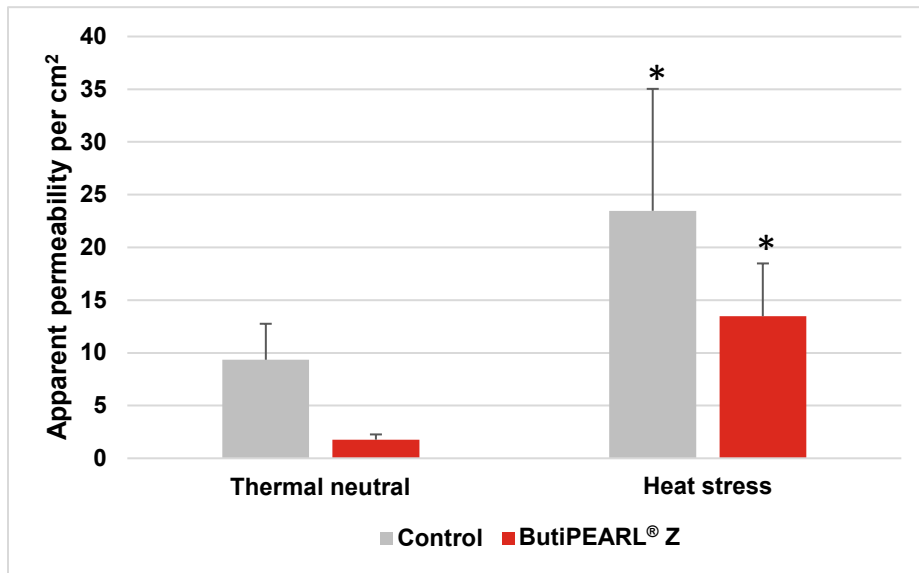
There was no BWG (improvement with BPZ prior to heat stress compared to control; however there was a significant increase in BWG during heat stress (Table 1).

**Table 1.** Broiler body weight gain (BWG) during heat stress

BWG (g/d)	Control	ButiPEARL® Z
BWG (g/d) (0-28d)	54.51	52.88
BWG (g/d) (29-47d)	52.13a	58.81b

\*Day 0-28d of age; \*\*Day 29-47 day of age; N=16 pens/treatment; 14 birds/pen

There was a significant heat stress effect on intestinal macromolecule permeability (Figure 1a) regardless of treatment. Intestinal macromolecule permeability of ButiPEARL Z was numerically lower than the control prior to (d28) and during heat stress (d32).



\* Indicates heat stress effect P<.05.

**Figure 1.** Effect of ButiPEARL® Z on intestinal permeability during HS and thermal neutral conditions



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Additionally, ButiPEARL Z showed a 4 pt improvement in adj FCR (Figure 1b) at 47d.

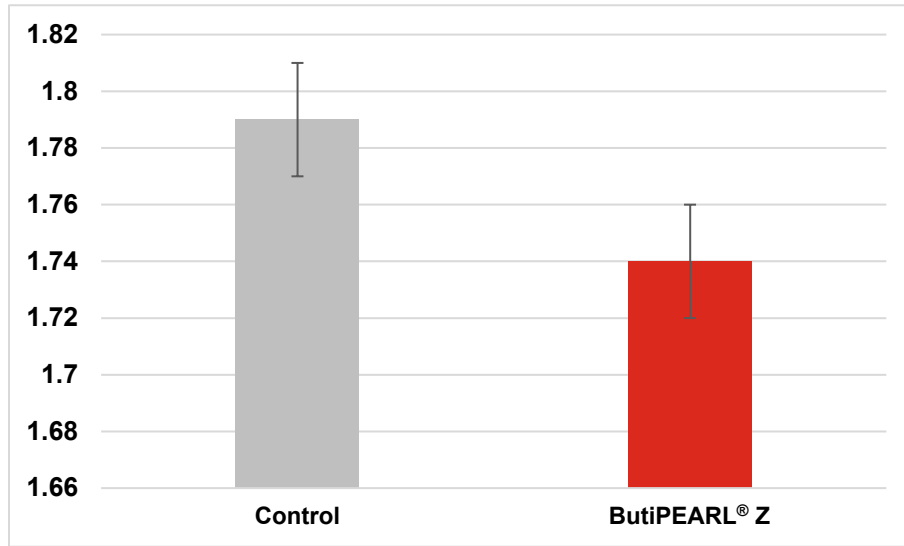


Figure 2. Effect of ButiPEARL® Z on feed conversion ratio (FCR) at day 47

## Conclusions

The data provides evidence ButiPEARL Z may alleviate the negative effects of heat stress on growth performance and intestinal integrity.

### References

1. Kemin Internal Document 16-00212
2. Kemin Internal Document, 15-00140.
3. Kemin Internal Document, 15-00142.

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