



The Effect of Encapsulated Butyric Acid and Zinc on Turkey Poults Performance

ABSTRACT

The objective of this study was to evaluate the impact of encapsulated butyric acid and zinc (EBZ) on performance parameters in turkey poults. A total of 720, 7-day (d) old birds were allotted to 1 of 2 treatments (15 rep/trt; 24 birds/rep): a) Control = integrator conventional diet b) Encapsulated butyric acid and zinc (EBZ) = integrator conventional diet + EBZ (1 lb./ton). Birds were evaluated until 42 days of age. Feed intake (FI), body weight (BW) and feed conversion ratio (FCR) were measured at the end of the trial (d42). At 21d, a necropsy was performed on 2 randomly-selected birds per pen (30 birds per group). The primary focus of this necropsy was to evaluate the ceca for the presence of desirable content appearance. This is defined as green in color and pasty in consistency. The addition of EBZ to the diets significantly improved FCR adjusted for mortality by 6.5 points when compared to the control ($P < 0.05$). Birds fed EBZ had significantly lower feed intake when compared to the control ($P < 0.05$) with a similar BW to control ($P > 0.05$). The ceca desirable content appearance improved by 50% with EBZ. This study demonstrates that encapsulated butyric acid and zinc may have a positive impact on overall poult gut health and performance, improving FCR and ceca content.

INTRODUCTION

Butyric acid is a by-product of microbial fermentation of products such as non-starch polysaccharides and has been shown to improve gastrointestinal health and reduce incidence of colon cancer in humans (Brons et al., 2002). Butyric acid has a positive effect on intestinal integrity by affecting the tight junctions by enhancing the expression of its proteins (Peng et al., 2009; Wang et al., 2012) and promoting healing of the intestinal epithelium (Ma et al., 2012). Zinc also enhances the expression of the tight junction proteins: occludin, claudin-1 and Zo-1 (Zhang et al., 2009; Zhang et al., 2012). Butyric acid and zinc have complementary modes of action; they both positively affect the intestinal health.

Kemin manufactures and markets ButiPEARL™ Z, an encapsulated source of butyric acid and zinc for swine and poultry diets. ButiPEARL Z has been shown to improve growth performance and gut integrity of broilers in previous trial work (Vignale et al., 2017). In addition, butyric acid and zinc have been shown to improve livability in antibiotic free (ABF) turkey toms (Kemin Internal Document 17-00186). The objective of this study was to evaluate the impact of encapsulated butyric acid and zinc (EBZ) on performance parameters of turkey poults under a conventional turkey program.

MATERIALS AND METHODS

The current trial was conducted at an integrator turkey house in Arkansas. Hen poults were from the same brooder flock hatched in Arkansas. On day 1, poults were divided in two rings and assigned to 1 of 2 dietary treatments: Control = integrator conventional diet, or encapsulated butyric acid and zinc (EBZ: ButiPEARL Z: Kemin Industries) = control + EBZ (1lb./ton). A total of 60 pens were set up in an alternating fashion post-brooding at ~6 days of age. At 7 days, 360 poults per treatment were allotted to pens based on ± 1 S.D. of those weights. All selected poults were weighed individually. Twenty-four hen poults were placed in each pen ($n = 360$ birds per treatment; 15 pens/treatment) to mimic the tightest commercial density (0.70 sq. ft/bird).

At the end of week 6, body weights of individual poults within a pen and remaining feed per pen were weighed to determine body weight gain, feed consumption and adjusted FCR.

A necropsy was performed at 2.5 to 3 weeks of age on 2 randomly-selected birds per pen (30 birds per group). The primary focus of this necropsy was to evaluate the ceca for the presence of desirable content appearance, which is defined as green in color and pasty in consistency.

RESULTS AND DISCUSSION

Adding EBZ to the diets significantly improved FCR adjusted to mortality by 6.5 points when compared to the control (Figure 1; $P < 0.05$). Birds fed EBZ had significantly lower feed intake when compared to the control (Table 1; $P < 0.05$) with similar BW to control (Table 1; $P > 0.05$).

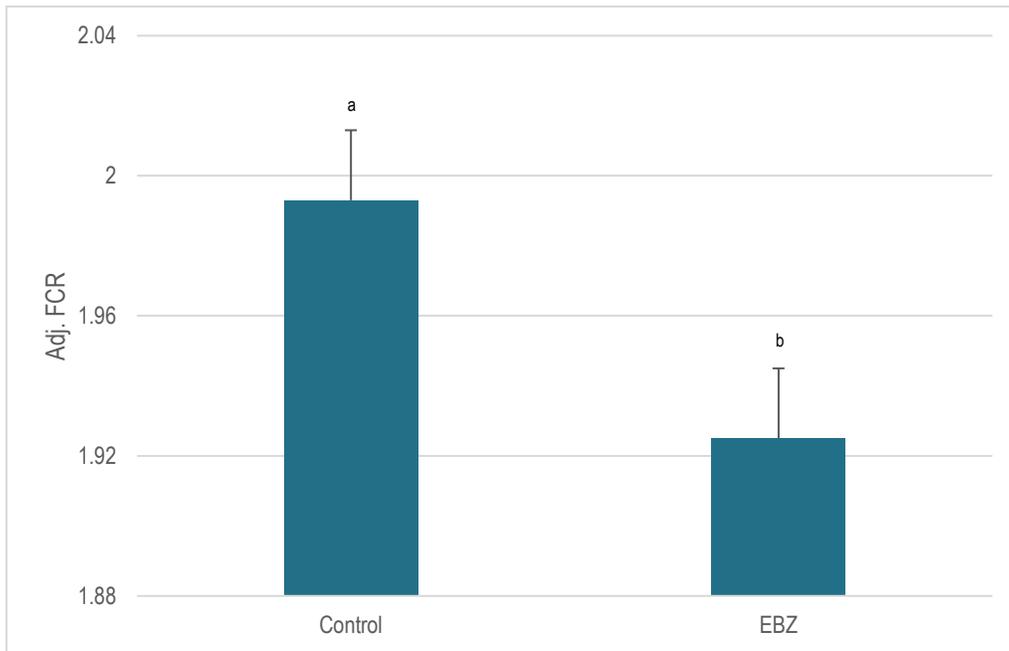


Figure 1: The effect of encapsulated butyric acid and zinc (EBZ) on adjusted feed conversion ratio (FCR) of 6-week-old turkey poults. Treatments: Control = integrator conventional diet, EBZ = integrator conventional diet + EBZ at 1 lb./ton ^{a-b}Differing superscripts indicate significant difference $P < 0.05$.

Table 1. The effect of encapsulated butyric acid and zinc (EBZ) on average BWG and feed intake (FI) in turkey poults.

Treatment ¹	Avg BWG	FI
Control	2.05	4.135 ^a
EBZ	2.025	3.954 ^b
P- value	0.28	0.02
SEM	0.014	1.03

¹Control = integrator conventional diet, EBZ = integrator conventional diet + EBZ at 1 lb./ton
^{a-b}Differing superscripts indicate significant difference $P < 0.05$.

The ceca desirable content appearance (green and pasty) was improved by 50% when EBZ was fed (Table 2). Desirable ceca content may help with reducing litter humidity. EBZ has been shown to improve litter humidity in a previous turkey study (Kemin Internal Document 17-00186). Further, EBZ has been shown to improve gut integrity and permeability in broilers (Vignale et al., 2017). Reduced permeability may result in more desirable ceca content appearance which may be one of the contributing factors to dryer litter.

Table 2. The effect of encapsulated butyric acid and zinc (EBZ) on ceca desirable content appearance

Treatment ¹	Green ²	Pasty ²	Green and Pasty ²
Control	10/30	15/30	6/30
EBZ	14/30	20/30	12/30

¹Control = conventional integrator diet, EBZ = conventional integrator diet + EBZ at 1 lb./ton.

²Indicates number of birds showing ceca desirable content out of total number of birds sampled

CONCLUSIONS

Encapsulated butyric acid and zinc showed an improvement in FCR adjusted to mortality and ceca desirable content appearance in turkey poult.

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