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FEEDING HIGHER LEVELS OF AN ENCAPSULATED SOURCE OF BUTYRIC ACID EXHIBITS ADDITIONAL PRODUCTION PERFORMANCE IN BROILERS[1]

Abstract

An experiment was conducted to ascertain the effect of an embedded source of butyric acid on performance variables (weight gain and feed conversion) of male Cobb broilers reared to 42 days of age. This study is a repeat of a previous Kemin trial (TL-12-00073), “Butyric Acid Supplementation Exhibits Positive Impact on Production Performance of Broilers” and designed to include higher levels of butyric acid. In the first trial, linear responses were determined for weight gain and feed conversion but no quadratic or plateau in growth performance was defined in the first study.

The experiment consisted of six treatments replicated eight times with each floor pen containing 50 male Cobb broiler chickens. The experiment was conducted from day of age through 42 days of age and the birds were weighed by pen on day 0, 21, 35 and 42. The treatments were: 1) Positive control (PC) formulated to provide adequate nutrition to meet the requirements across a three phase feeding regimen; 2) PC + 100 g/ton of an embedded source of butyric acid (100 g/t); 3) PC + 200 g/ton of an embedded source of butyric acid (200 g/t); 4) PC + 300 g/ton of an embedded source of butyric acid (300 g/t); 5) PC + 400 g/ton of an embedded source of butyric acid (400 g/t); and 6) PC + 500 g/ton of an embedded source of butyric acid (500 g/t).

Weight gain was not significantly different ($P > 0.05$) across treatments at 21 days of age. Whereas, feed conversion was significantly ($P < 0.05$) improved for 400 and 500 g/t compared to PC. Weight gain was significantly improved ($P < 0.05$) for 300, 400 and 500 g/t compared to PC at 35 days of age. A significant improvement ($P < 0.05$) was noted for feed conversion at 35 days of age as 500 g/t was more efficient than PC. Weight gain at 42 days of age was significantly improved ($P < 0.05$) for 400 and 500 g/t compared with the PC. Feed conversion was significantly improved ($P < 0.05$) for 500 g/t compared with the PC. Feed consumption across all treatments was not significantly ($P > 0.05$) different for any data collection period. Overall, mortality ranged from 2.2 to 4.3% and was insignificant ($P > 0.05$). Based on the results of this study, the beneficial inclusion level for an embedded source of butyric acid in broilers reared to 42 days of age is 400 g/t based on weight gain and 500 g/t based on feed conversion. Taking into consideration weight gain and feed conversion, the recommended optimum inclusion level for an embedded source of butyric acid in broilers is 1 lb per short ton. This recommendation is an increase over the previous recommendation of 300 g/t based on the data generated in first study[1,2].

Introduction

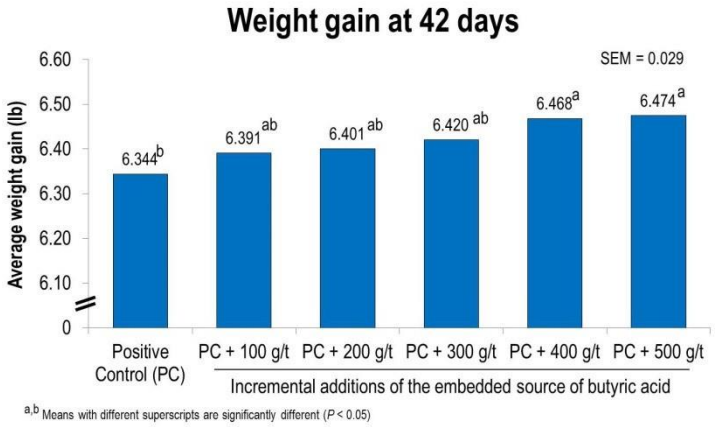
Short chain fatty acids promote the growth of tissues lining the gastrointestinal tract in monogastrics[3]. Of these, butyric acid is considered the most efficient. The intestinal tract in the bird contains numerous finger-like projections called villi, which have different types of epithelial cells. Enterocytes are specific absorptive epithelial cells found on the villi. Butyric acid is known as a preferred energy source for enterocytes and seems to be a stimulant for villi growth[4]. Butyrate is quickly absorbed in the upper digestive tract such as the cro

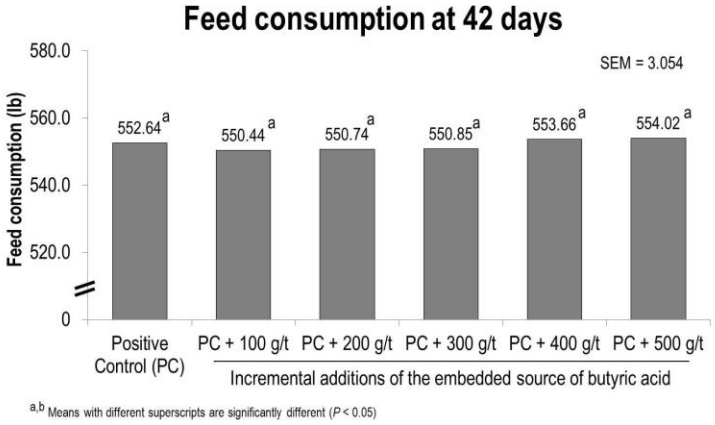
which makes it a less than ideal feed additive[5]. However, the efficacy of butyrate has been shown to increase when fed in a protected form such as encapsulation[6]. Researchers have shown butyrate is necessary for normal development of epithelial cells; therefore, if the butyrate could bypass degradation in the crop and proventriculus, the epithelial cells in the small intestine could utilize the butyrate[7].

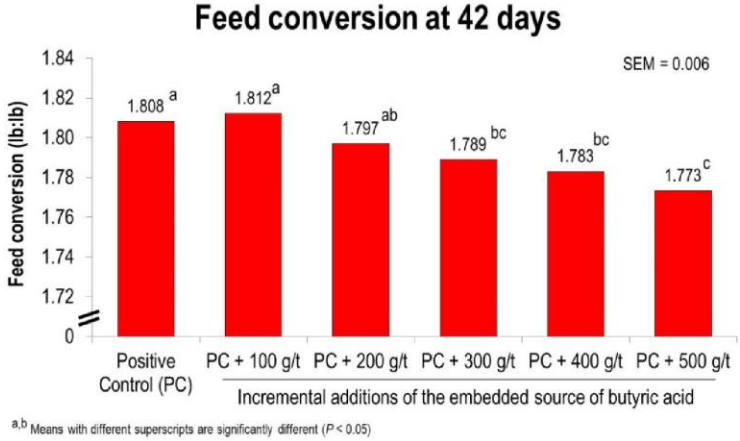
Materials and Methods

A trial was conducted with male Cobb broilers at the University of Georgia Poultry Research Center in cooperation with Southern Poultry Research. The data presented is from a trial in which an embedded source of butyric acid was fed at 100, 200, 300, 400 or 500 g/t inclusion[1]. Broilers were allotted on day 0 post-hatch to the control or treatment groups. Each group consisted of 8 replications per treatment with 50 broilers per replicate pen. The experiment was conducted for 42 days. Broilers were weighed on day 0, 21, 35 and 42 for determination of body weight gain (BW gain), feed consumption, feed conversion and mortality. The stocking density, after subtracting out for equipment, was 0.90 ft^2 per broiler.

Feed was fed as crumbles in the starter phase and as pellets during the grower and finisher phases. All diets were provided *ad libitum* in one tube-feeder per pen. The broilers were fed a corn and soybean meal based diet with 8% addition of corn DDGS and a commercial phytase throughout all three feeding phases. In the starter and grower phases, there was also 60 g/t Bio-Cox and 50 g/t BMD added. All diets were formulated to meet or exceed the nutritional requirements suggested for 0 to 42 day old broilers. The treatments consisted of a control diet and a treatment diet. The treatment diet consisted of the control diet plus an embedded source of butyric acid added on top for mixing prior to pelleting.







Results

At 42 days of age, BW gain was significantly increased ($P < 0.05$) for broilers fed 400 or 500 g/t compared with broilers fed PC ($P < 0.05$). Feed consumption at 42 days of age was not significant ($P > 0.05$) with any inclusion level. Broilers fed 500 g/t of an embedded source of butyric acid improved in feed conversion compared with broilers fed the PC, 100 g/t or 200 g/t treatment levels. There was also an improvement in feed conversion at 300 g/t and 400 g/t levels compared to broilers fed the PC and 100 g/t levels. There was no significant difference ($P > 0.05$) in mortality. The overall results suggest commercial broilers fed 400 g/t or more had an improvement in overall growth performance.

Conclusion

Broilers supplemented with an embedded source of butyric acid at an inclusion rate of 400 g/t showed a 0.13 lb increase in BW gain at the end of 42 days. Additionally, the broilers fed 500 g/t in their diet exhibited a 3.5 point improvement in feed conversion as compared to the PC group, 1.773 vs. 1.808, respectively. For optimal overall growth performance, the recommended inclusion level for an embedded source of butyric acid in broilers is 1 lb per short ton.

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